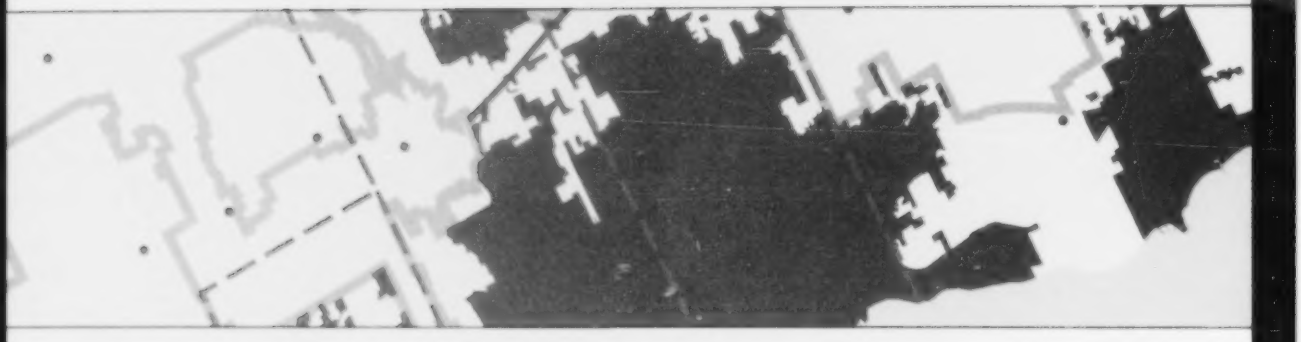
PLACES TO GROW

BETTER CHOICES. BRIGHTER FUTURE.

Built Boundary

for the Growth Plan for the Greater Golden Horseshoe, 2006

2008



Ministry of Public Infrastructure Renewal

Ontario

Built Boundary

for the Growth Plan for the Greater Golden Horseshoe, 2006

2008

The built boundary has been defined in accordance with Policy 2.2.3.5 of the *Growth Plan for the Greater Golden Horseshoe, 2006* and is issued on April 2, 2008.

Ministry of Public Infrastructure Renewal

Ontario

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Dear Colleagues,

The McGuinty government established the Places to Grow initiative to manage growth in the province and to ensure Ontario is healthy, safe, and livable. We want vibrant and complete communities that have the right mix of housing, jobs, and services, are easy to get around in, and are home to people engaged in building a sustainable and prosperous future for themselves, their families and their neighbours.

The *Growth Plan for the Greater Golden Horseshoe, 2006* was prepared and approved under the *Places to Grow Act, 2005* which took effect on June 16, 2006.

I am pleased to issue the built boundary. It has been defined in accordance with Policy 2.2.3.5 of the *Growth Plan for Greater Golden Horseshoe, 2006*. The built boundary has been verified and delineated in consultation with affected municipalities in the Greater Golden Horseshoe (GGH) for the purposes of implementing and monitoring a number of key policies of the Growth Plan.

My ministry has researched and developed an innovative methodology which has been used to verify and delineate this built boundary consistently and accurately across the entire GGH. This landmark work represents the first time that urban growth can be reliably monitored and measured and it will contribute significantly to how our communities manage growth and plan for the future.

Considerable effort, dedication and expertise were put into this initiative by not only my ministry staff, but also by our partner municipalities, partner ministries, stakeholders and experts.

This paper outlines the methodology that was used to delineate the built boundary and provides maps of the built boundary for each single- and upper-tier municipality in the GGH for use in implementing the *Growth Plan for the Greater Golden Horseshoe, 2006*. This paper and other information and tools related to implementing the Growth Plan can be found at www.placestogrow.ca.

Yours sincerely,

David Caplan
Minister

Table of Contents

SECTION 1. Introduction 1

SECTION 2. Methodology to Define the Built Boundary for the Greater Golden Horseshoe 7

Step 1: Create a Parcel Land-Use Database 7
Step 2: Select Settlement Areas for which a Built Boundary will be Developed 10
Step 3: Generate Grid-cell Mapping for the Settlement Areas Identified in Step 2 12
Step 4: Refine the Grid-cell Mapping to Create a Built Boundary 17

SECTION 3. Built Boundary Maps 25

SECTION 4. Definitions 48

Appendices 51

Get Involved 72

Terms and Definitions

The terms "brownfield sites", "built-up area", "built boundary", "density target", "designated greenfield area", "Greater Golden Horseshoe", "greyfields", "intensification", "intensification target", "redevelopment", "settlement areas", and "urban growth centres" are used in this document with the same meaning and definition as in the *Growth Plan for the Greater Golden Horseshoe, 2006*. For convenience, these definitions have been reproduced in Section 4 of this document.

Notes on Maps and Illustrations

The information displayed in illustrations and base maps in this document has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of these illustrations and maps.

SECTION 1.

Introduction

Places to Grow - The Growth Plan for the Greater Golden Horseshoe

On June 16, 2006, the Government of Ontario released the *Growth Plan for the Greater Golden Horseshoe, 2006*. It was prepared under the Places to Grow Act, 2005, as part of the Places to Grow initiative to plan for healthy and prosperous growth throughout Ontario. The *Growth Plan for the Greater Golden Horseshoe, 2006* can be found at www.placestogrow.ca.

Figure 1 below shows the Greater Golden Horseshoe Growth Plan Area.

Figure 1: The Greater Golden Horseshoe (Source: Schedule 1, the *Growth Plan for the Greater Golden Horseshoe, 2006*).

SECTION 1.

Introduction

Places to Grow - The Growth Plan for the Greater Golden Horseshoe

On June 16, 2006, the Government of Ontario released the *Growth Plan for the Greater Golden Horseshoe, 2006*. It was prepared under the Places to Grow Act, 2005, as part of the Places to Grow initiative to plan for healthy and prosperous growth throughout Ontario. The *Growth Plan for the Greater Golden Horseshoe, 2006* can be found at www.placestogrow.ca.

Figure 1 below shows the Greater Golden Horseshoe Growth Plan Area.

Figure 1: The Greater Golden Horseshoe (Source: Schedule 1, the *Growth Plan for the Greater Golden Horseshoe, 2006*).

The *Growth Plan for the Greater Golden Horseshoe, 2006* aims to:

- Revitalize downtowns to become vibrant centres;
- Create complete communities that offer more options for living, working, shopping and playing;
- Provide greater choice in housing types to meet the needs of people at all stages of life;
- Curb sprawl and protect farmland and green spaces; and
- Reduce traffic gridlock by improving access to a greater range of transportation choices.

The Built Boundary and the Growth Plan for the Greater Golden Horseshoe

This paper outlines the methodology to delineate the built boundary, and provides maps of the built boundary for each single- and upper-tier municipality in the Greater Golden Horseshoe for use in implementing the *Growth Plan for the Greater Golden Horseshoe, 2006.*

The *Growth Plan for the Greater Golden Horseshoe, 2006* supports the creation of compact, mixed-use and transit-supportive communities. It requires municipalities to accommodate a significant portion of future residential and employment growth through intensification.

Intensification is the development of a property, site or area at a higher density than currently exists through:

- redevelopment, including the reuse of brownfield sites;
- the development of vacant and/or underutilized lots within previously developed areas;
- infill development; or
- the expansion or conversion of existing buildings.

Intensification yields many benefits, such as:

- revitalizing neighbourhoods and downtowns;
- making more efficient use of existing infrastructure;
- supporting more frequent transit service;
- reducing development pressures on valuable agricultural lands and important natural spaces; and
- providing a wider range of housing choices closer to amenities such as shopping and schools, which in turn increases convenience and reduces the amount of time spent traveling between destinations.

Figures 2a and 2b illustrate the transformation of a hypothetical site in a downtown through intensification. Through the addition of a few mid- and low-rise buildings on vacant sites, and pedestrian-oriented landscaping and paving, the neighbourhood depicted below is revitalized and transformed into a more vibrant and complete community.

Figure 2a: Before.

Figure 2b: After.

A key policy in the Growth Plan is the establishment of an intensification target, which specifies that by 2015 and each year thereafter, a minimum of 40 per cent of new residential development will occur within the built-up areas of each upper- or single-tier municipality [Growth Plan Policy 2.2.3.1]. The intensification target is a minimum target and municipalities are encouraged to plan for higher densities in built-up areas. Municipalities, through their intensification strategies, will identify areas appropriate for intensification within their built boundary.

Built-up areas are defined as the lands within the built boundary. They are those parts of a community's settlement area that are already developed.

Figure 3 below illustrates the Growth Plan definitions and terminology relevant to the built boundary.

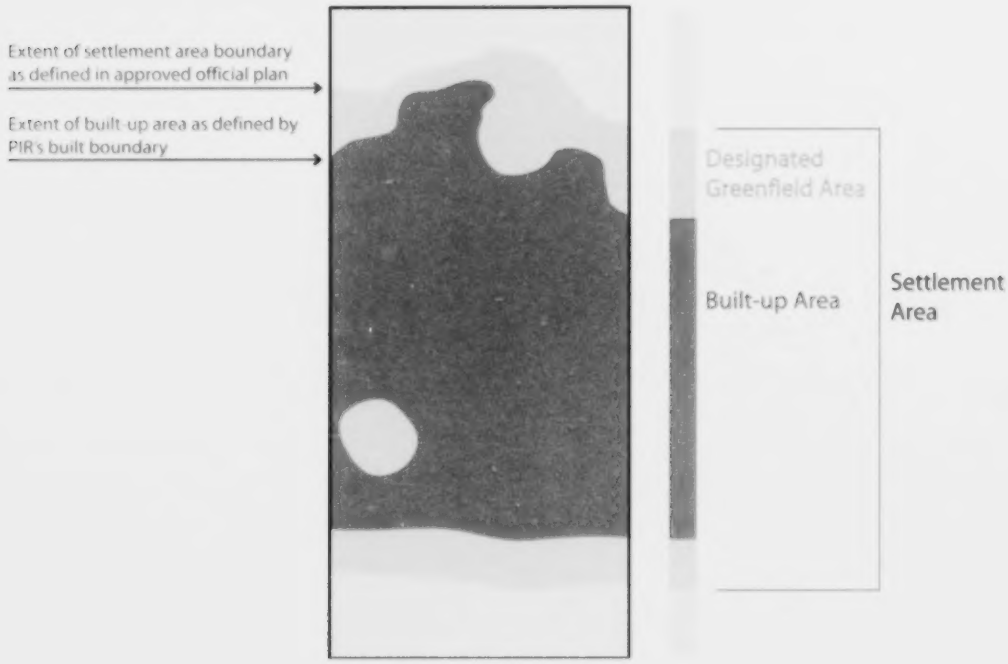
Extent of settlement area boundary as defined in approved official plan
Extent of built-up area as defined by PIR's built boundary
Designated Greenfield Area
Built-up Area
Settlement Area

Figure 3: Terminology relevant to the built boundary.

The built boundary identifies the built-up area as of June 16, 2006, which is the effective date of the Growth Plan. The built boundary is fixed in time for the purposes of implementing and monitoring a number of key policies of the Growth Plan. Residential development occurring within the built boundary will be counted towards achievement of the intensification target. Lands that lie outside the built boundary but that are within the settlement area are subject to the Growth Plan's designated greenfield area policies, including the designated greenfield area density target. The settlement area boundary is defined by the respective municipal official plan. The Growth Plan's minimum density target for designated greenfield areas will be measured over the entire designated greenfield area of each upper- or single-tier municipality, and not on individual plans of subdivision.

The Province and municipalities will be able to measure the achievement of the Growth Plan's intensification and designated greenfield area policies, assess municipal land needs, as well as monitor the implementation and effectiveness of the objectives of the Growth Plan in building more complete, transit-supportive, vibrant and diverse communities and maximizing the use of existing infrastructure.

It is important to emphasize that the built boundary is not a land-use designation and the delineation of the built boundary will not confer any new land-use designations, nor alter existing land-use designations. Any development on lands within the built boundary is still subject to the relevant provincial and municipal land-use planning policies and approval processes.

The inclusion of lands within the built boundary does not necessarily mean that these lands will be developed or built upon. For example, the inclusion of a municipal park that is in its final form and within the built-up area does not imply that it will be redeveloped. Similarly, existing stable neighbourhoods within the built-up area might not be a focus for intensification.

Developing the Built Boundary for the Greater Golden Horseshoe

The Growth Plan defines the built boundary as "the limits of the developed urban area as defined by the Minister of Public Infrastructure Renewal in accordance with Policy 2.2.3.5". Policy 2.2.3.5 of the Growth Plan states that the Minister, in consultation with affected municipalities will verify and delineate the built boundary.

Between 2005-2007, the Ministry of Public Infrastructure Renewal reviewed existing methodologies and available data sources, and developed an innovative methodology to verify and delineate the built boundary for the Greater Golden Horseshoe. A summary of this review is included in Appendix 4 of this paper.

In November 2006, the Ministry of Public Infrastructure Renewal released the *Technical Paper on a Proposed Methodology for Developing a Built Boundary for the Greater Golden Horseshoe* which described four proposed steps to delineate the built boundary. The Ministry received numerous submissions and comments on the proposed methodology. Based on the input received, the methodology was finalized.

In late 2006, a preliminary draft built boundary was derived using data from the Ontario Parcel Alliance (OPA), the Municipal Property Assessment Corporation (MPAC) and datasets maintained by Land Information Ontario. The Ministry of Public Infrastructure Renewal verified this preliminary draft version of the built boundary, the underlying data and assumptions with all municipalities in the Greater Golden Horseshoe in the winter and spring of 2007.

Feedback and advice from municipalities based on their local, expert knowledge, was used to delineate a proposed final built boundary. In November 2007, the Ministry of Public Infrastructure Renewal released a technical paper titled *Proposed Final Built Boundary for the Growth Plan for the Greater Golden Horseshoe, 2006* which

contained the final methodology and maps of the proposed final built boundary. Suggested refinements and corrections to the mapping, proposed by municipalities and stakeholders, were reviewed and used to finalize the built boundary contained in this document.

This paper contains the full methodology to delineate the built boundary, and provides maps of the built boundary for each single- and upper-tier municipality in the Greater Golden Horseshoe for use in implementing the *Growth Plan for the Greater Golden Horseshoe, 2006*.

A PDF copy of this paper and the maps are available on the Places to Grow website at www.placestogrow.ca. The built boundary is also available in geographic information system (GIS) format from the Ministry upon request and is subject to an end-user license agreement with the Ministry.

SECTION 2.

Methodology to Define the Built Boundary for the Greater Golden Horseshoe

The methodology, the Ministry of Public Infrastructure Renewal has used to define the built boundary, has four steps. The first three steps involve a GIS analysis of the primary data to determine the approximate extent of built-up areas in the Greater Golden Horseshoe. Step 4 involves verification and refinement of the built boundary.

Step 1: Create a Parcel Land-Use Database

Step 1 involves the selection and compilation of the primary data sources.

1.1 Select the most appropriate primary datasets

The first step in developing the built boundary is the selection of appropriate primary data sources, which can be used to identify urbanized areas. A number of basic criteria are used in order to select appropriate datasets. The data needs to be:

- consistently available and applicable across the entire Greater Golden Horseshoe;
- able to identify land use on a consistent, Greater Golden Horseshoe-wide geography to determine built-up uses;
- compatible with local and regional planning practices, and land-use and planning boundaries;
- able to maintain privacy of confidential, property-related information; and
- able to track the location and amount of new residential units annually over the life of the Growth Plan.

The scale of the geographic unit of the primary datasets is also a critical factor since it determines the precision and character of the built boundary. The unit of geography used in the analysis, in this case the property parcel, is the building block for the built boundary line.

The primary datasets that meet the criteria above are:

1. **Tax Roll 2006 MPAC data (current to end of 2005)**
   MPAC administers a uniform, province-wide property assessment system, including a database of property types using registered Land Transfer Tax Affidavits. MPAC data is classified into property types or land uses such as commercial, industrial, residential, farm, multi-residential, and vacant. (Note: Rule vii in Step 4 allows for including built-up parcels that are not captured in the MPAC dataset but that were built-up as of June 16, 2006.)

2. **OPA data (current to May 2006)**
   OPA is jointly maintained by Teranet Enterprises Inc., MPAC and the Ministry of Natural Resources. It contains a standardized, Ontario-wide, geospatial dataset of assessment, ownership and Crown parcels of land. The OPA database includes parcel boundaries, assessment roll numbers, and property identification numbers where applicable.

It is important to note that the OPA and MPAC datasets obtained by the Ministry of Public Infrastructure Renewal contain only land-use, residential unit-count, and parcel number information. The datasets used to develop this methodology, and applied in this analysis, do not contain any confidential, personal or financial information.

For a detailed description of these two datasets and a list of attributes contained in the MPAC dataset obtained by the Ministry of Public Infrastructure Renewal, please refer to Appendices 2 and 3 of this paper.

Other datasets that were evaluated by the Ministry of Public Infrastructure Renewal for their suitability are also listed and described in more detail in Appendix 4.

1.2 Summarize land use data into manageable categories for further analysis

The MPAC dataset contains approximately 300 land-use attribute codes. This is more detail than is required for this analysis. These 300 codes are therefore sub-divided into six broader, simplified summary land uses: built, unbuilt, green space unavailable, variable, not a parcel, and unknown. These six summary uses are further reclassified into only built and unbuilt later in Step 3.

Summary Land Use	Typical Examples
Built	any residential, commercial, industrial and institutional use.
Unbuilt	rural, forest, farm, or vacant uses.
Green space unavailable	park, conservation area, etc.
Variable	golf course, ski area, quarry, etc. that would be considered built-up when inside a settlement area and unbuilt when outside.
Not a parcel	this land was not identified as a parcel for assessment purposes in the MPAC database. This would include features such as roads, highways, etc.
Unknown	no match possible between an Ontario Parcel and any record on the MPAC files. Of the 2.4 million parcels used in this analysis, only 7,899 parcels, or 0.33 per cent of the total were unknown.

Please see Appendix 3 for a full list of detailed MPAC land-use codes and their corresponding summary land-use coding.

1.3 Compile the database using primary datasets

The next step is to create an integrated database by linking the parcel number attributes in the two selected datasets in order to combine parcel boundary, residential unit count and land-use information. This combined parcel and land-use database is then used to determine which OPA parcels are considered built or unbuilt.

MPAC data and OPA datasets are linked to create a database with one record per parcel[1]. Each parcel's land use, geographic boundaries, and residential unit attributes are identified. Figure 4 illustrates the linking process for these two datasets.

Where records with multiple MPAC land-use codes are assigned to a single parcel (e.g. one parcel can contain both residential and recreational land uses), the parcel is classified as built, provided that at least one of the land-use codes assigned to the parcel has a known built use (e.g. residential). A parcel with multiple MPAC land-use codes is classified as unbuilt if all the property codes associated with it are unbuilt land uses.

Condominium files are aggregated to create parcel level data and not residential unit level data. The unique roll number allows for identification of which units corresponded to a particular condominium parcel. A separate joining process for

1 There are approximately 2.4 million OPA parcels in the Greater Golden Horseshoe. This excludes parcels for roads.

Figure 4: Linking MPAC and OPA datasets.

condominiums and their associated units is carried out to assign the unit data to its respective parcel.

The number of residential units on each parcel is computed and recorded. This allows for the calculation in Step 2 of the number of residential units in settlement areas. It also allows for the development of a baseline count for the number of residential units within the final built boundary, and will assist with tracking new residential units to assess achievement of the Growth Plan's intensification policies.

Step 2: Select Settlement Areas for which a Built Boundary will be Developed

In Step 2, settlement areas containing over 400 residential units are identified. By definition, the built-up area and built boundary must lie within a settlement area. The Growth Plan aims to direct intensification to settlement areas that can accommodate and service new growth. However, some settlement areas identified in local official plans are small, not fully serviced, and may not be appropriate as a focus for intensification.

The 400-unit threshold corresponds approximately with settlement areas that have full municipal servicing and capacity to support intensification and future growth.

2.1 Compile settlement area dataset

The Ministry of Municipal Affairs and Housing maintains land-use data derived from the latest, approved, publicly available individual municipal official plans. This information is used to compile a dataset of lands in the Greater Golden Horseshoe that are considered settlement areas as defined in the Growth Plan[2]. These lands are designated in the respective official plans for development and urban uses.

2 Settlement areas are defined in the Growth Plan as urban and rural settlement areas within municipalities (such as cities, towns, villages and hamlets) where development is concentrated and which have a mix of land uses; and where lands have been designated in an official plan for development over the long-term planning horizon provided for in the *Provincial Policy Statement, 2005*. Where there are no lands designated over the long-term, the settlement area may be no larger than the area where development is concentrated. This is essentially the same definition as that in the *Provincial Policy Statement, 2005*.

Figure 4: Linking MPAC and OPA datasets.

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The built boundary is developed for settlement areas identified as such in approved upper- and single-tier official plans. The approved lower-tier official plan is used where no upper-tier official plan exists.

2.2 Establish threshold size and identify settlement areas for which a built boundary will be developed

The Ministry of Public Infrastructure Renewal determined that the built boundary would be developed for settlement areas over a size threshold of 400 residential units. The cut-off of 400 residential units translates to approximately 1,000 persons based on an average household size of approximately 2.5 persons per residential unit[3] in the Greater Golden Horseshoe. This is consistent with Statistics Canada's cut-off of 1,000 persons for its definition of an urban area based on international comparative research.

In Step 4, all settlement areas of all sizes are reviewed again in consultation with their respective municipalities for suitability to accommodate intensification before a built boundary is delineated. Some settlement areas and their corresponding grid cells which are dropped in this step may be included again in Step 4.

Using the parcel land-use database, a count of residential units is run for all parcels contained within each polygon in the settlement area dataset. A parcel is counted inside of the settlement area if its geometric centre lies within the settlement area boundary. Individual settlement areas polygons (e.g. individual towns, hamlets, etc.) are treated separately in this analysis.

Polygons with 400 or more residential units are then selected.

Figure 5 illustrates the application of this threshold to the settlement area dataset. The red polygons on the map represent settlement areas containing fewer than 400 residential units. The pink areas represent settlement areas containing 400 or more residential units which met the threshold and are selected in this step. All settlement areas in the dataset containing fewer than 400 residential units are excluded.

Settlement Areas with less than 400 units
Settlement Areas with 400 or more units
Agricultural, Rural and other areas
Hydrological Features

Figure 5: Identification of threshold settlement areas for which a built boundary will be developed.

3 The ratio of 2.5 persons per unit is based on Statistics Canada's census findings for 2001.

Step 3: Generate Grid-cell Mapping for the Settlement Areas Identified in Step 2

This third step uses the MPAC-OPA database compiled in Step 1 and the settlement areas greater than the threshold size selected in Step 2, to identify and aggregate the land use information in the parcel and land-use database using a grid-cell overlay in order to manage the millions of parcel and land-use records.

3.1 Overlay grid-cell matrix on Growth Plan area

A grid-cell matrix is overlaid and used as a base to manage, group, and aggregate millions of land use and parcel records, making them standardized and manageable for further analysis. The grid-cell matrix is comprised of 250m X 250m square cells overlaid across the entire Greater Golden Horseshoe[4].

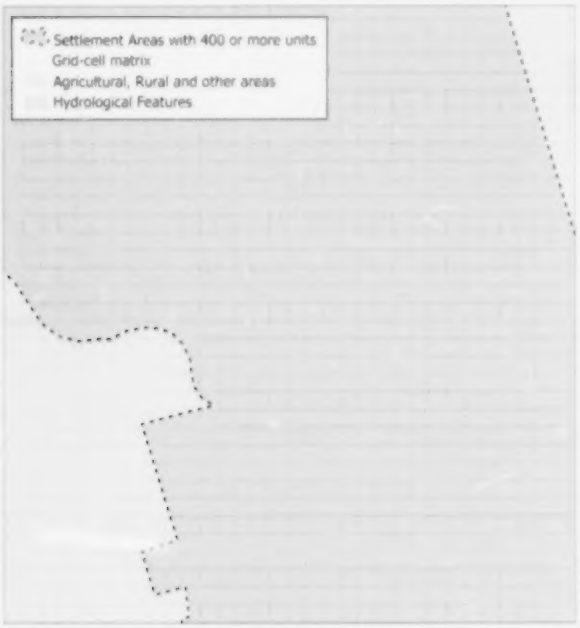

Figure 6: Overlay of grid-cell matrix.

The approximately 545,000 grid-cells covering the geography of the Greater Golden Horseshoe allow for the grouping of underlying land-use and parcel codes into each corresponding cell while still being small enough to accurately represent the underlying land use[5]. Using a larger grid cell reduces the accuracy of the methodology. A smaller grid cell increases the computational challenges without any real improvement in the accuracy of the methodology.

Figure 6 illustrates the overlay of the grid-cell matrix on the settlement area base created in Step 2.

4 (1 cell = 6.25 hectares). This size is chosen as being optimum for both specificity and manageability. As a point of size reference, each cell can contain approximately 200 average single-family residential parcels. Tests done on the grid cell size indicate that if the cell sizes were much larger, then the analysis would be cruder and less accurate. If the cell sizes were smaller, then the computational challenge would be much greater.

5 Note that tests done in terms of the origin point of the grid-cell network and its impact on the results of the process indicate that moving the grid network would not appreciably alter the analysis.

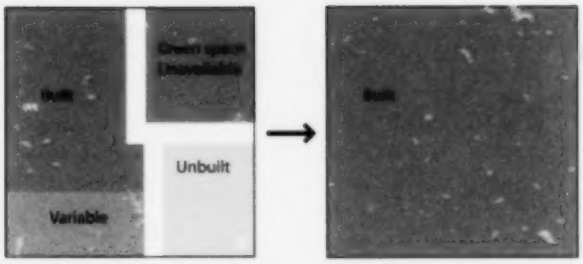

Figure 7: Assignment of dominant summary land use to a grid cell.

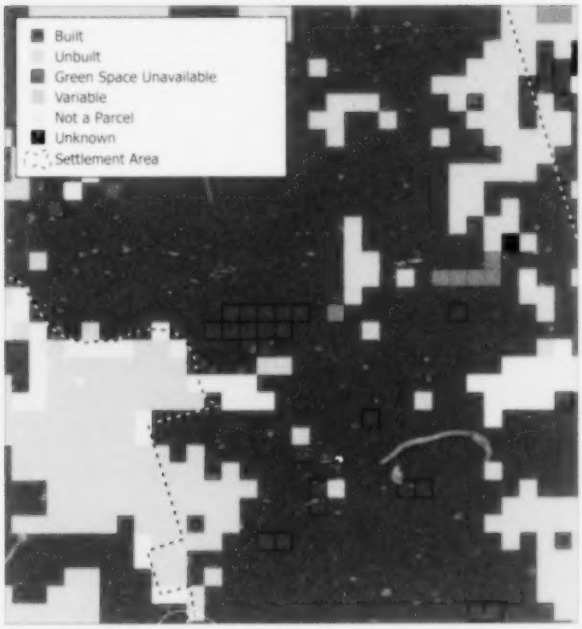

Figure 8: Assignment of dominant land uses to the grid-cell matrix.

3.2 Assign one of six summary land uses to each grid cell in the Growth Plan area

Summary land uses identified in Step 1.3 are assigned to grid cells for the purpose of aggregation and further generalization. This step establishes whether a cell has enough of a particular summary land use in it to represent that use.

The land area of each summary land use in each cell is computed. The cell is given the summary land use that had the highest percentage of land area within that cell.

Figure 7 illustrates how the dominant summary land use of several parcels contained within an individual grid cell is assigned to that particular grid cell.

Each grid cell is given one of the six summary uses developed in Step 1.2. Figure 8 illustrates the assignment of dominant land uses to the grid-cell matrix.

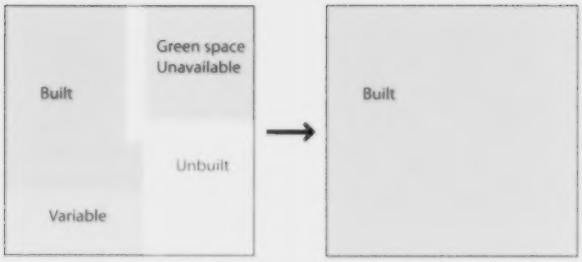

Figure 7. Assignment of dominant summary land use to a grid cell.

Figure 8. Assignment of dominant land uses to the grid cell matrix.

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Each grid cell is given one of the six summary uses developed in Step 1.2. Figure 8 illustrates the assignment of dominant land uses to the grid-cell matrix.

3.3 Select all cells that fall within settlement areas over the threshold size

This step determines which grid cells fall within the selected settlement areas for which a built boundary will be developed. Grid cells and their corresponding summary land uses qualify as belonging to a settlement area if 50 per cent or more of the cell's area lies within the settlement area boundary.

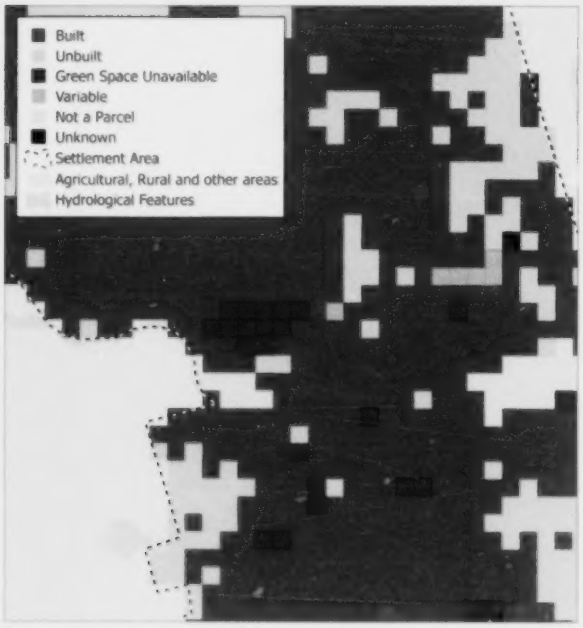


Figure 9: Selection of cells that fall within settlement areas for which a built boundary will be developed.

All cells that fall outside the threshold settlement areas, though identified as built in Step 3.2, are dropped from the database and not included in the next steps of the methodology as they lie in settlement areas that have fewer than 400 residential units or lie outside of settlement area boundaries.

However, as mentioned above, in Step 4, all settlement areas of all sizes are reviewed again in consultation with their respective municipalities for suitability to accommodate intensification before a built boundary is delineated. Some settlement areas and their corresponding grid cells which are dropped in this step may be included again in Step 4.

Figure 9 illustrates the selection of grid cells that fall within settlement areas for which a built boundary will be developed.

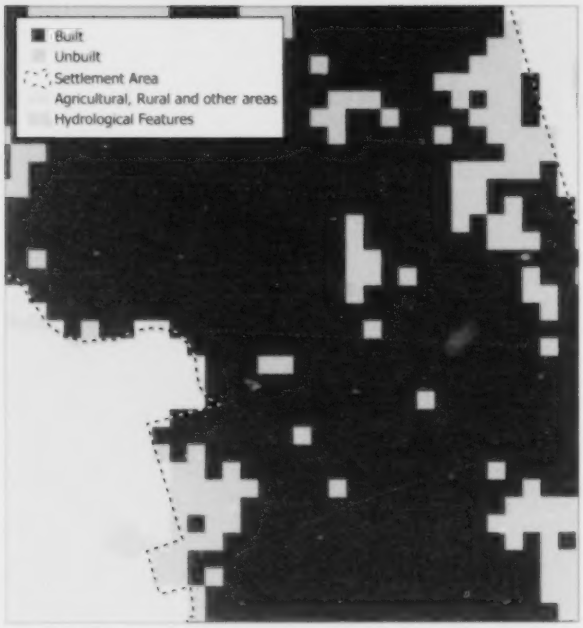


Figure 10: Assignment of six summary land uses to the two categories of built and unbuilt.

3.4 Assign all grid cells as either built or unbuilt

In this step, summary land uses are further reclassified as either built or unbuilt based on their land-use attributes. Cells coded as variable, no parcel, and greenspace not available, are all converted to built grid cells. All unknown cells are converted to unbuilt.

This is done to create two broad categories and to identify only those cells that represented built-up areas on the ground, prior to their further generalization and aggregation in Step 3.5.

Figure 10 illustrates the result of the conversion of the six summary land uses given to cells (illustrated in Figure 9), to the two categories of built and unbuilt.

3.5 Consolidate and aggregate the built grid cells to approximately identify built-up areas

The result of Step 3.4 includes built grid-cells in large, contiguous groupings that represent established built-up areas on the ground, or cells scattered on the periphery that represent newer, non-contiguous, fringe development.

Step 3.5 uses automated GIS operations applied in sequence to consolidate built grid-cells representing established built-up areas. This step also links smaller groupings of built grid cells, usually representative of patchwork development on the fringe of urban areas which are in the process of being developed, to larger groupings of built grid cells to make them contiguous. This step also drops built grid cells that are scattered or non-contiguous.

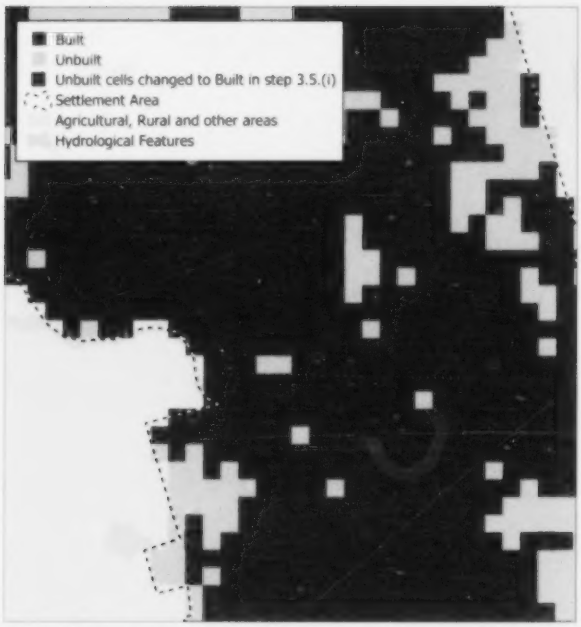


Figure 11: Application of step 3.5.(i) – Joining nearby cells or groups of cells.

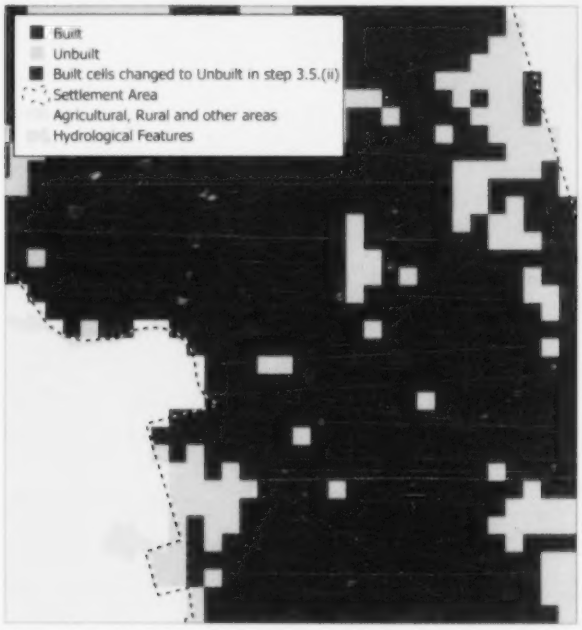


Figure 12: Application of step 3.5.(ii) – Dropping cells or small groups of cells that are further away and on their own.

The following GIS operations constitute this step:

i. Join nearby cells or groups of cells: If a built grid cell or group of built grid cells are separated by only one cell width from another built grid cell or group of built grid cells, the one-cell width of unbuilt grid cell is reassigned as built[6]. Built grid cells touching on their diagonals are considered to be contiguous and joined to their adjacent cells. The grid cells reassigned from unbuilt to built are illustrated in Figure 11. This step is intended to include fringe development that is developed enough and close to larger, established built-up areas to be considered contiguous with them.

ii. Drop cells or small groups of cells that are further away and on their own: On completion of Step 3.5.(i) above, separate groupings of fewer than eight contiguous built grid cells, containing fewer than 400 residential units, are reclassified as unbuilt grid cells so as to exclude stand-alone built-up areas that are too small to contribute meaningfully to the intensification objectives of the Growth Plan. Figure 12 illustrates this step.

6 This rule is applied only once for each built grid cell, meaning that, in a succession of built grid cells separated by one unbuilt grid cell, only the first built grid cell closest to the larger grouping of built grid cells is joined in order to avoid a "domino" joining effect.

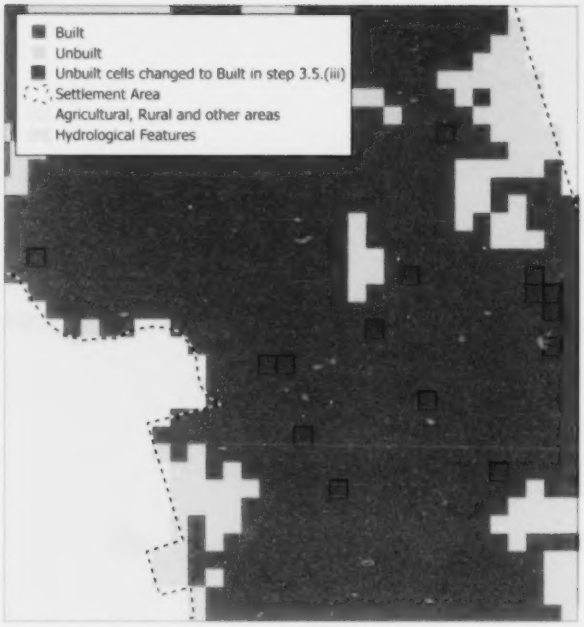


Figure 13: Application of step 3.5.(iii) - Filling in small groups of unbuilt cells that are surrounded by built cells.

iii. Fill in small groups of unbuilt cells that are surrounded by built cells:
On completion of Step 3.5.(ii) above, groupings of fewer than six contiguous unbuilt grid cells that are surrounded by built grid cells, are reclassified as built. This results in a more contiguous built area. Any future development within the small areas added in this step would be supportive of the Growth Plan's intensification objectives. Or, these areas may represent small parks and open areas, the uses of which would remain unchanged if included in the built boundary. Figure 13 illustrates this step.

Step 4: Refine the Grid-cell Mapping to Create a Built Boundary

Step 4 involves verification and refinement of the grid-cell mapping to create a detailed built boundary that can be identified on the ground. This step provides a final set of refinement rules to apply to the grid-cell mapping, using a variety of GIS and other data sources such as MPAC and OPA data, orthophotography, building starts and completions, official plan schedules, road networks, and water features to delineate a built boundary that is identifiable on the ground and aligned with roads, water features, and property parcels.

The Ministry of Public Infrastructure Renewal has worked in consultation with single-, upper- and lower-tier municipalities, as well as stakeholders and other public bodies, to apply these final refinement rules in a consistent manner across the Greater Golden Horseshoe.

The following refinement rules are applied in sequence to the built grid cells generated in Step 3 to create a built boundary for the Greater Golden Horseshoe.

Rule i. Refine settlement areas for which a built boundary will be delineated

In Rule i, all settlement areas, including those identified in Step 2 are further reviewed for suitability to accommodate intensification, prior to delineating a built boundary.

A precise boundary is delineated for those settlement areas, identified in consultation with municipalities, that have full municipal services, will be a focus for intensification, or will accommodate significant future growth.

Undelineated built-up areas for smaller, unserviced or partially-serviced settlement areas, which have limited capacity to accommodate significant future growth, are represented as dots in the maps in Section 3. These settlement areas are typically small towns and hamlets. Since they are not expected to be a focus for intensification, they do not require a delineated built boundary for future monitoring purposes.

The built boundary is developed for settlement areas identified as such in approved upper- and single-tier official plans. The approved lower-tier official plan is used where no upper-tier official plan exists.

Where two settlement areas are adjacent, functionally connected, and within the same upper- or single-tier municipality, they are considered a single settlement area for the purposes of delineating a built boundary.

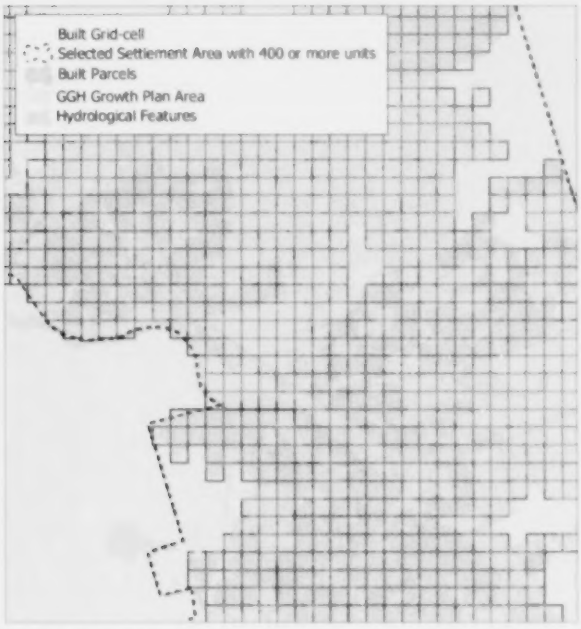


Figure 14: Illustration of built parcels falling within built grid cells.

Rule ii. Revert from grid cells to parcels

The grid-cell mapping in Step 3 provides for a coarse identification of built-up areas, and does not follow parcel or road boundaries. In Rule ii, the parcel boundaries are overlaid on the grid cell map and each parcel is categorized as either built or unbuilt. Parcels whose geometric centres fall within built or unbuilt grid cells are assigned that corresponding built or unbuilt status. The grid-cell structure is then removed, leaving only the OPA parcel fabric with its built and unbuilt attributes as a starting point for further refinement. The outcome of this rule is illustrated in Figure 14.

Rule iii. Verify land uses of parcels

In this refinement rule, parcels assigned as built but which are known through more detailed local knowledge or data to be unbuilt, are reassigned as unbuilt. MPAC data may have several land uses for a single parcel which results in parcels with predominantly non-urban, unbuilt uses on them appearing as built. Also, some gravel pits, golf courses, campgrounds, private parks, etc. are re-classified as unbuilt if they are considered interim uses by the respective municipality.

Rule iv. Assign all brownfield sites and greyfield sites as built

Brownfield sites or greyfield sites not already identified as built in previous steps are identified through consultation with municipalities and classified as built.

Rule v. Reassign certain unbuilt parcels adjacent to Provincial 400-series highways as built

Unbuilt parcels lying between the built parcel edge and the centre-line of a 400-series provincial highway are reassigned as built, when the distance between the outer edge of the nearest built parcel and the centre-line of the highway is less than 1km. Otherwise they are treated as unbuilt.

Figures 15a and 15b below illustrate the application of this refinement rule.

Figure 15a

Figure 15b

Figure 15a shows built and unbuilt parcels adjacent to a 400-series highway. Figure 15b shows all unbuilt parcels lying between built parcels that are within 1km of the highway classified as built.

Rule vi. Include land uses that are in their final form within the built boundary

Parcels currently occupied by the features or uses listed below are considered built since they are in their final form i.e. not available for redevelopment, and when they are surrounded by or adjacent to built parcels.

- Municipal, federal and provincial parks.
- Existing servicing and community infrastructure such as water and sewage treatment plants, landfills, water towers, cemeteries, school yards, etc.
- Transportation infrastructure such as highway rights-of-way, highway interchanges, canals, airports, rail yards, active railway rights-of-way, docks etc.

Natural heritage features and areas, and floodplains where development is expressly prohibited, and which are completely surrounded by built parcels are also included in the built boundary. Parcels containing natural heritage features and areas and floodplains, and which are almost completely surrounded by built parcels, are also included in some cases for minor rounding-off. The inclusion or exclusion of such features from the built-up area does not signify that they can be built on or redeveloped.

Rule vii. Include recent development prior to Growth Plan effective date

This rule allows for the inclusion of parcels with built structures that existed on June 16, 2006, but which have not been identified in earlier steps (for example parcels that had not yet been assessed by MPAC) to be included if such development was clustered around, or adjacent to other built parcels. Isolated single parcel developments are not generally included.

Structures that had a foundation laid prior to June 16, 2006 are generally considered built. Data supplied by municipalities, including building permits issued prior to June 2006 and MPAC data, are used to determine the status of lands under construction as of June 2006.

However, in only those cases where the Ministry of Public Infrastructure Renewal was not able to obtain information on the precise location of built structures within a partially-built registered plan of subdivision, the built boundary was drawn to include the entire registered plan if it was estimated by the municipality that the majority of parcels were built prior to June 16, 2006. If it was determined that a minority of parcels were built prior to June 16, 2006, the entire registered plan was excluded from the built boundary.

Figures 16a and 16b illustrate the application of this refinement rule.

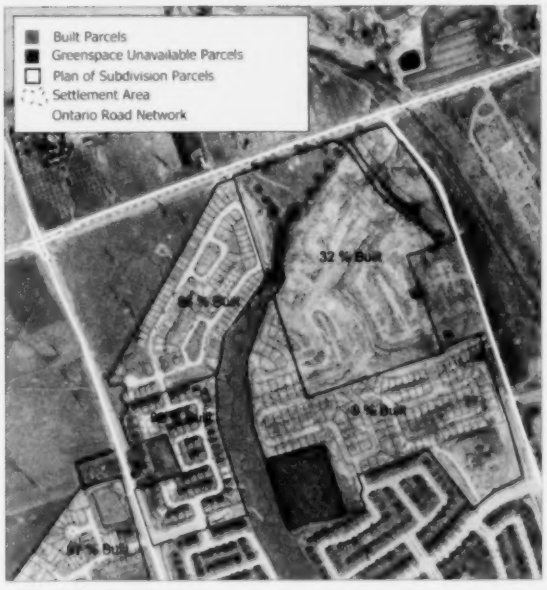


Figure 16a

Figure 16b

Figure 16a shows the built and unbuilt parcels in partially-developed registered plans of subdivision. Figure 16b shows the built boundary including the entire registered plan of subdivision where the majority of the subdivision is built.

Rule viii. Align the built boundary with roads, rail lines, and water features

In this rule, the built boundary is generally aligned with centre-lines of roads in the Ontario Road Network (ORN) dataset, active rail lines, or with the edges of water bodies such as rivers and lakes, if such features lie within 100m of either side of the edge of the outermost built parcel.

If the built boundary is aligned with a road which is a 400-series provincial highway, a canal or waterway, or an active rail line, then the edge of the highway adjacent to the built-up area or highway interchange right-of-way, canal right-of-way, or the active rail right-of-way respectively, is the edge of the built-up area.

Figures 17a and 17b illustrate the application of this refinement rule.

Figure 17a

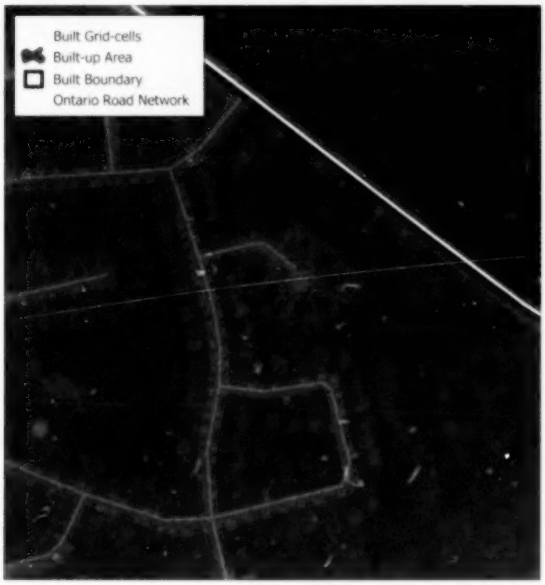


Figure 17b

Figure 17a shows roads within 100m of built parcels. Figure 17b shows the built boundary is established as the centre-line of the road.

Rule ix. Align the built boundary with parcel edges if no appropriate roads or water features are present

If no roads or water features lie within 100m of the edge of the built parcels, the built boundary is aligned with the edge of the outermost built parcel within the settlement area. Figures 18a and 18b below illustrate the application of this refinement rule.

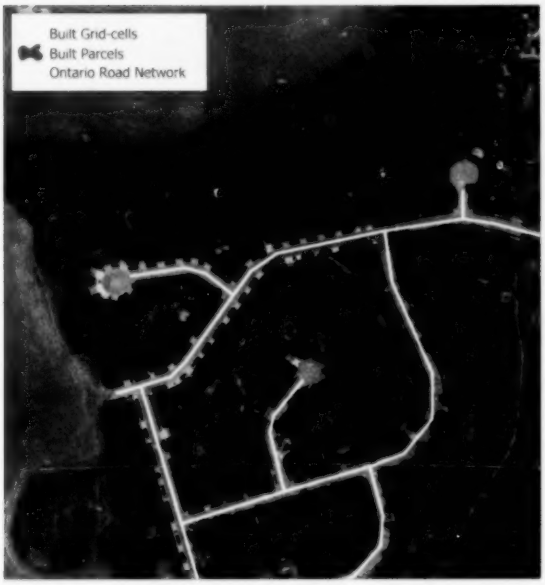


Figure 18a

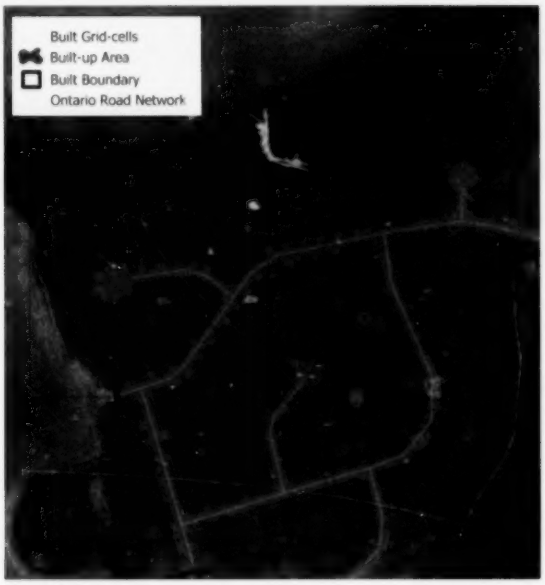


Figure 18b

Figure 18a shows built parcels. Figure 18b shows that the parcel boundary serves as the built boundary in the situation where there is no road or water feature within 100m to align with.

Rule x. Treatment of holes in the built-up area

In order to create a largely contiguous built-up area, groups of unbuilt parcels of less than 37.5 hectares[7] and completely surrounded on all sides by built parcels, are included within the built boundary. All urban growth centres are included within the built boundary. Larger vacant areas, greater than 37.5 hectares, remain as greenfield "holes" within the built boundary. In a very limited number of instances, some smaller holes also remain where a municipality considers these areas to be a greenfield rather than built-up area.

Figures 19a and 19b below illustrate the application of this refinement rule.

Figure 19a

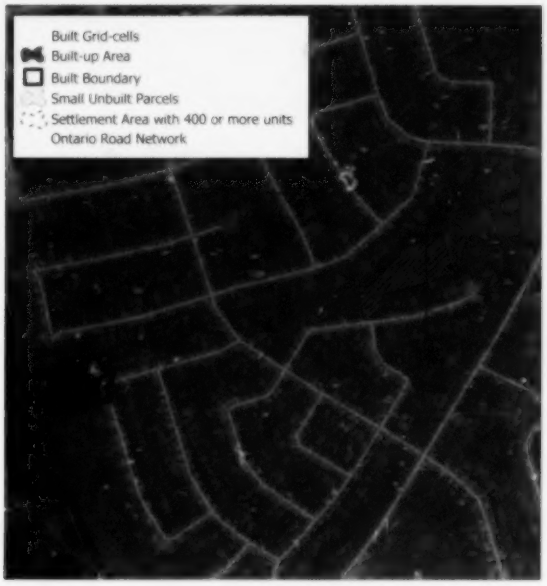


Figure 19b

Figure 19a shows unbuilt areas less than 37.5 hectares surrounded by built areas. Figure 19b shows the built boundary which includes unbuilt areas.

Rule xi. Limit the built boundary to the settlement area boundary

The built boundary must lie within a municipal settlement area boundary. On the ground, individual built parcels may extend beyond settlement area boundaries. In such circumstances those parcels are excluded from the built boundary. Generally, the built boundary follows road centre-lines, water feature edges, and property parcel boundaries, and not the settlement area boundary.

Where the settlement area is defined conceptually in a municipal official plan, and not as an identifiable line, the Ministry of Public Infrastructure Renewal has worked with the municipality to limit the built boundary to within the approximate extent of the settlement area.

7 Area of 6 grid cells.

SECTION 3.

Built Boundary Maps

The following section provides maps of the built boundary for the Greater Golden Horseshoe and each upper- and single-tier municipality in the Greater Golden Horseshoe. Maps for all upper- and single-tier municipalities are provided at the same scale.

The built boundary has been defined in accordance with Policy 2.2.3.5 of the *Growth Plan for the Greater Golden Horseshoe, 2006*. The built boundary has been verified and delineated in consultation with affected municipalities in the Greater Golden Horseshoe and is being issued for the purpose of implementing the *Growth Plan for the Greater Golden Horseshoe, 2006*.

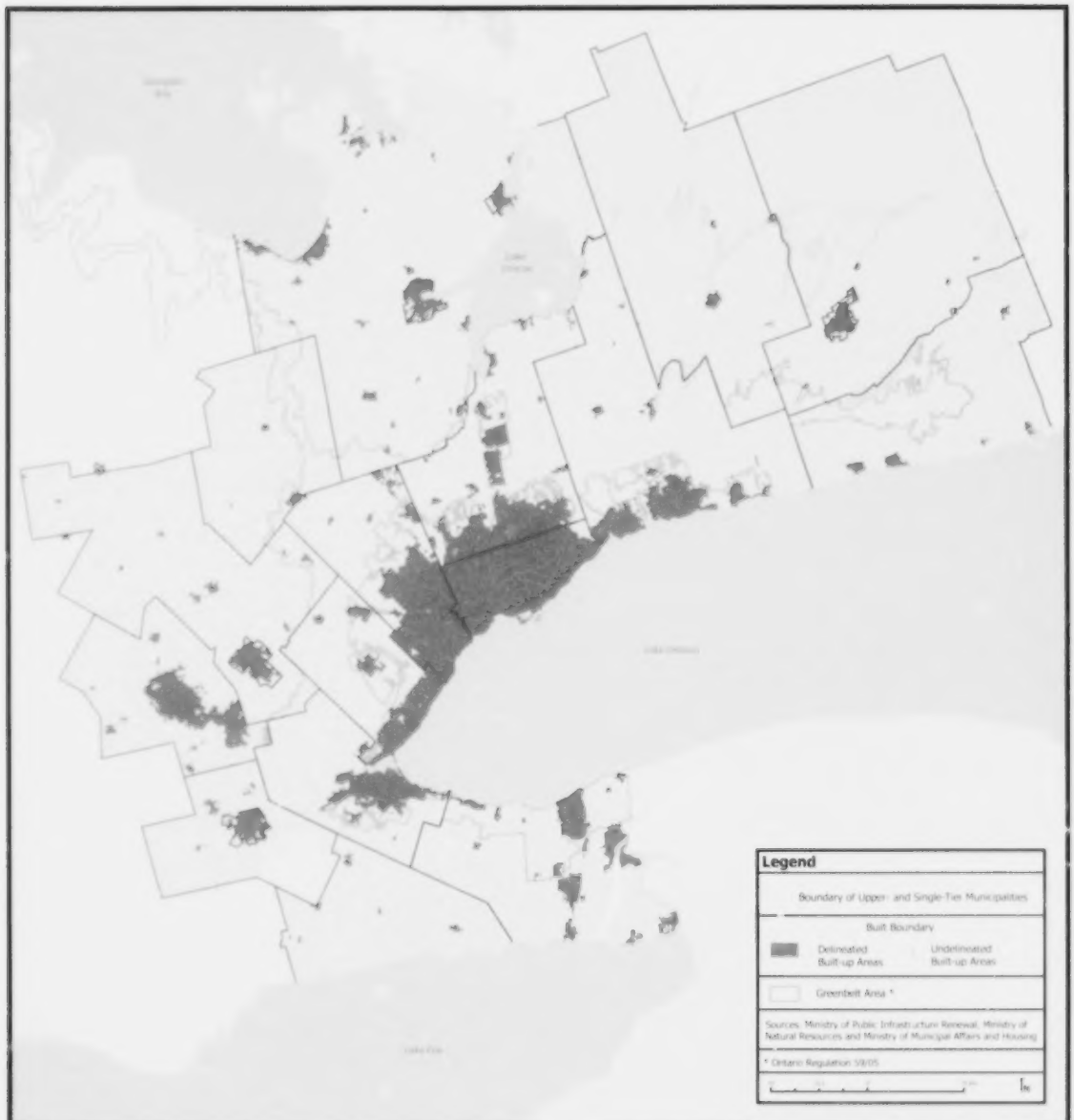
First Nations reserve lands are not subject to Ontario's land use planning system and First Nations reserve lands are not in the Growth Plan area. Mapping for First Nations reserve lands is based on the "Ontario Indian Reserves 2006 Update" dataset from the Land Information Ontario database of the Ministry of Natural Resources and is current to March 2006.

The built boundary consists of delineated built-up areas and undelineated built-up areas.

A precise boundary is delineated for those settlement areas, identified in consultation with municipalities, that have full municipal services, will be a focus for intensification, or will accommodate significant future growth.

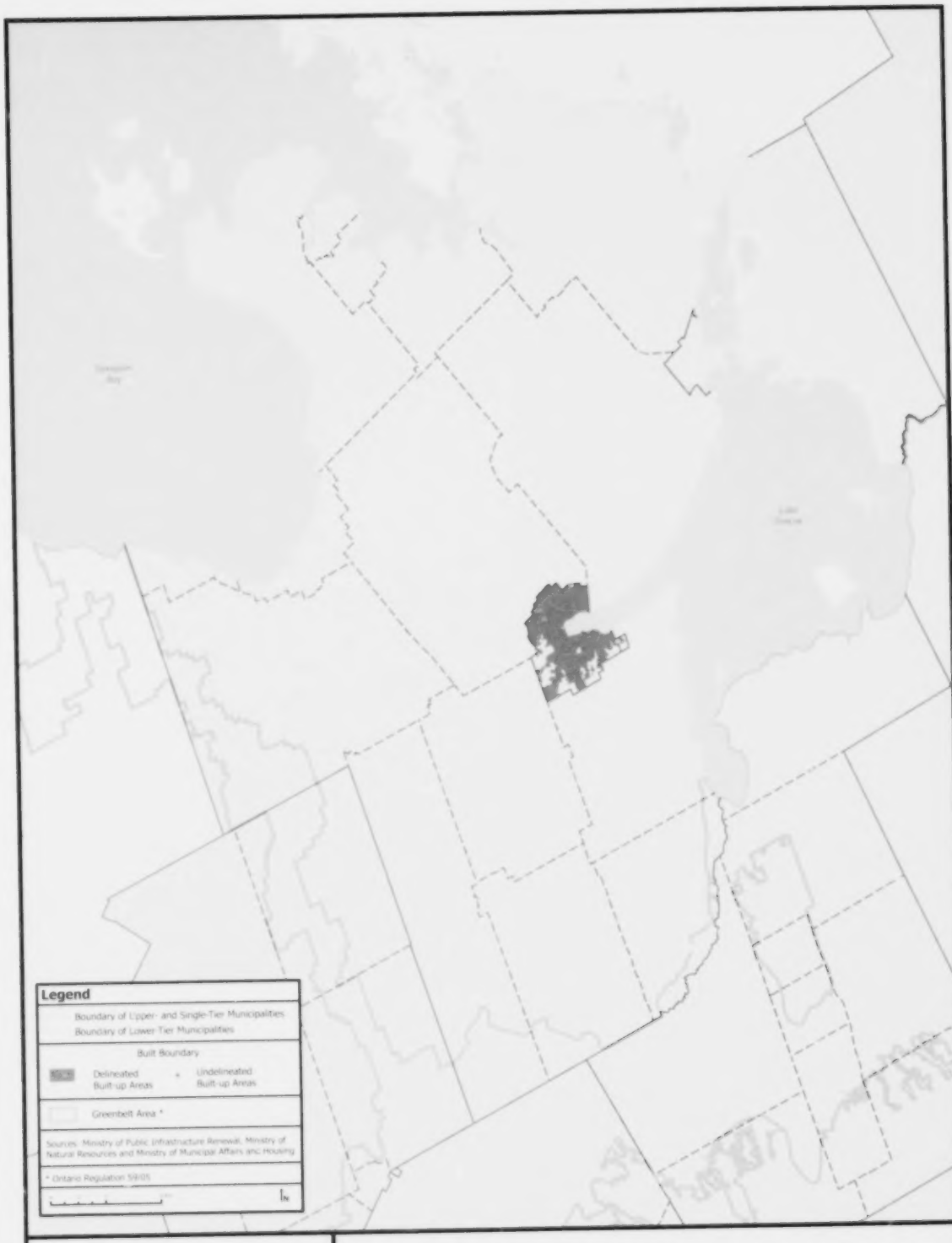
Undelineated built-up areas for smaller, unserviced or partially-serviced settlement areas, which have limited capacity to accommodate significant future growth, are represented as dots. These settlement areas are typically small towns and hamlets.

The built boundary is developed for settlement areas identified as such in approved upper- and single-tier official plans. The approved lower-tier official plan is used where no upper-tier official plan exists.


Legend
Boundary of Upper- and Single-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

Built Boundary for the Greater Golden Horseshoe

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
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Built Boundary
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Built Boundary for the City of Barrie

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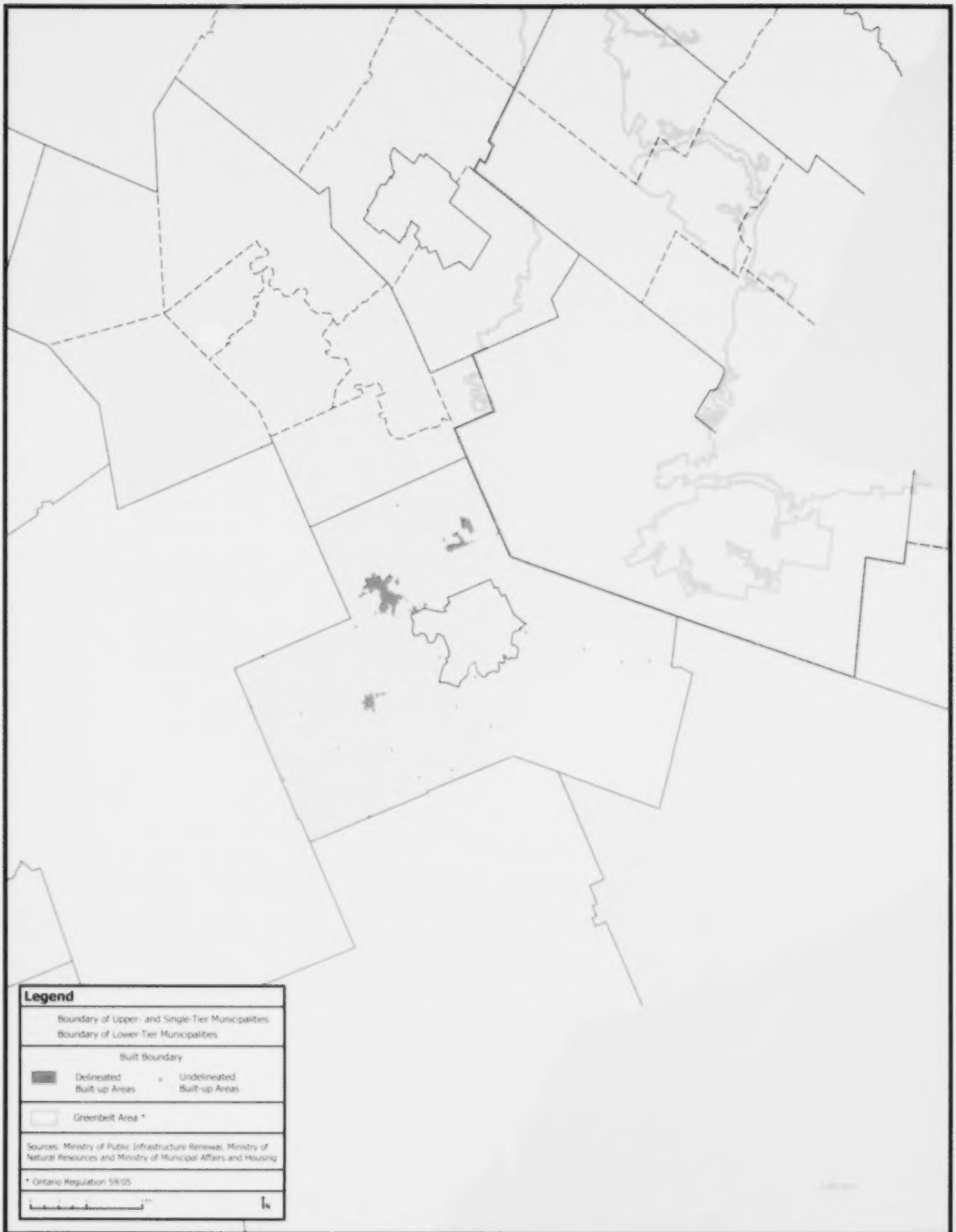
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Greenbelt Area *
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Built Boundary for the County of Brant

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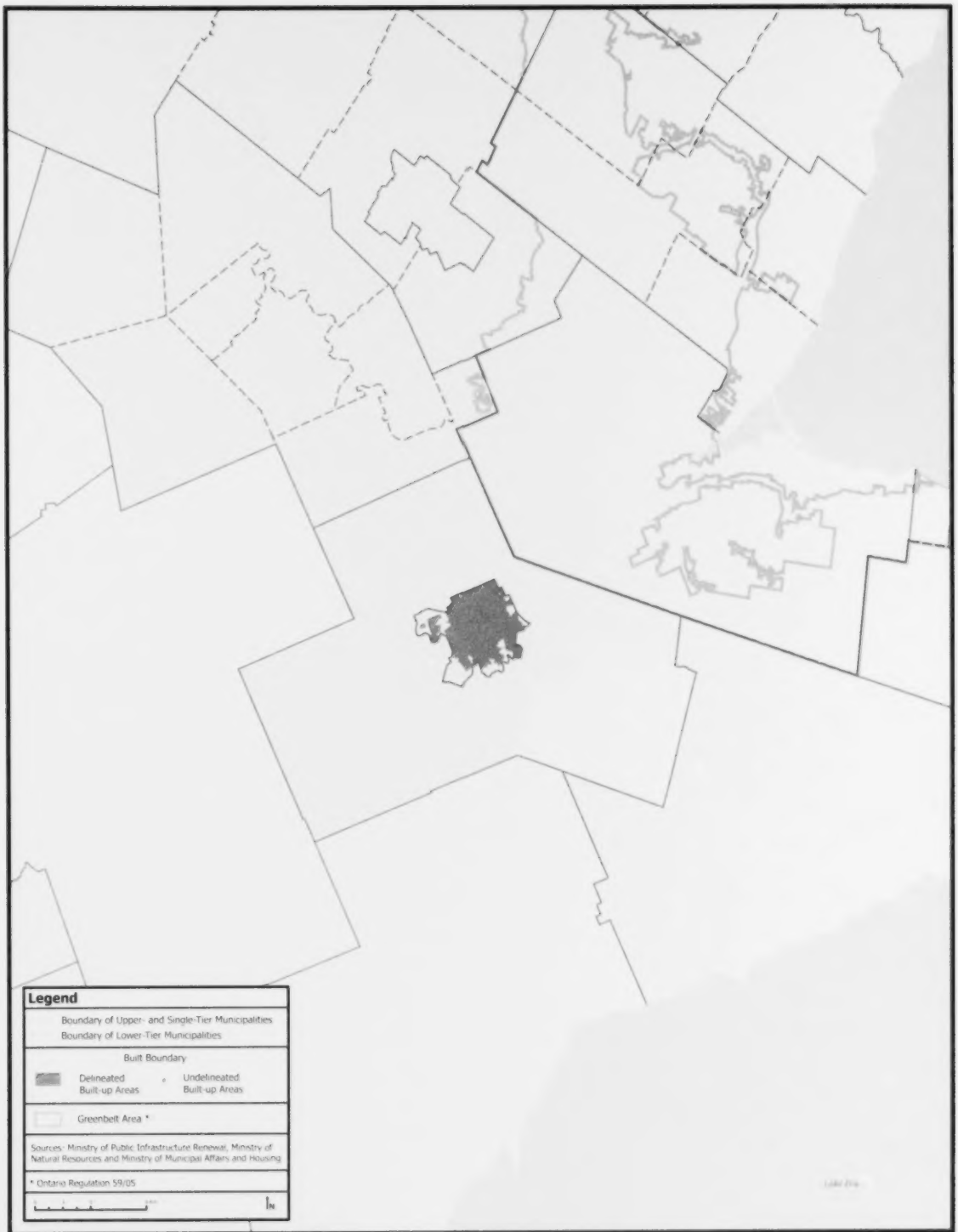
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Built Boundary for the City of Brantford

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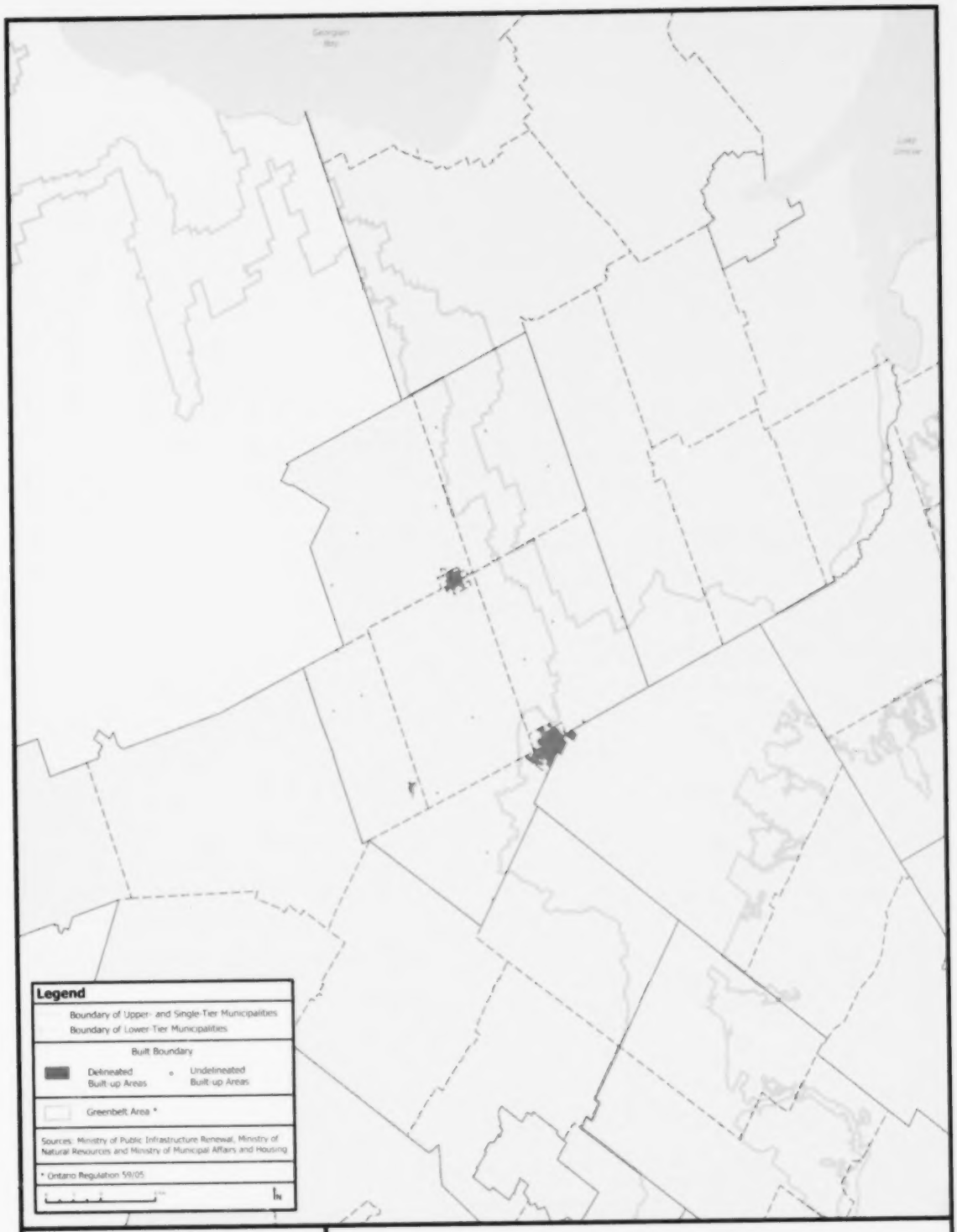
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
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Undelineated Built-up Areas
Greenbelt Area *
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Built Boundary for the County of Dufferin

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Legend
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Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
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Built Boundary for the Region of Durham

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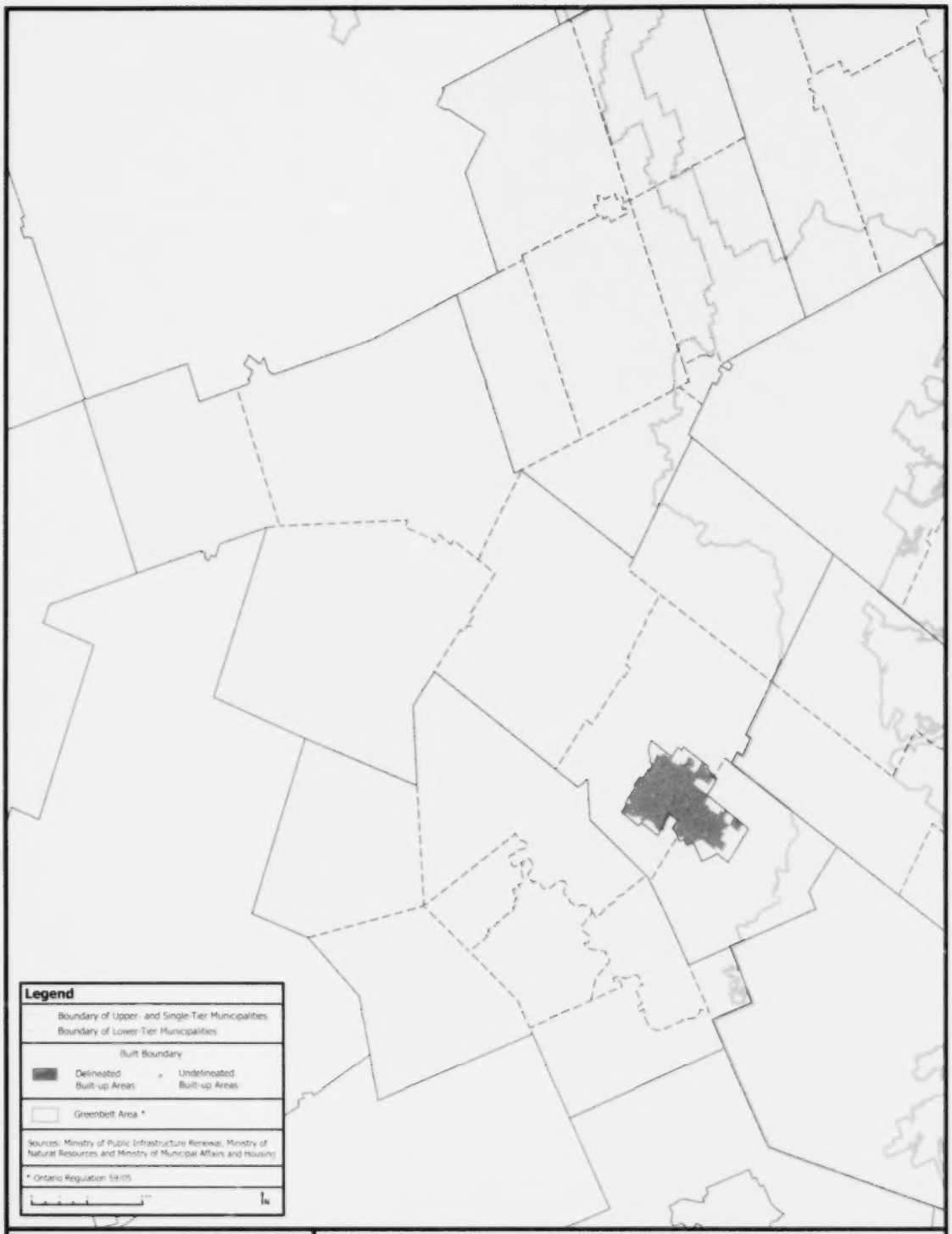
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
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Built Boundary for the City of Guelph

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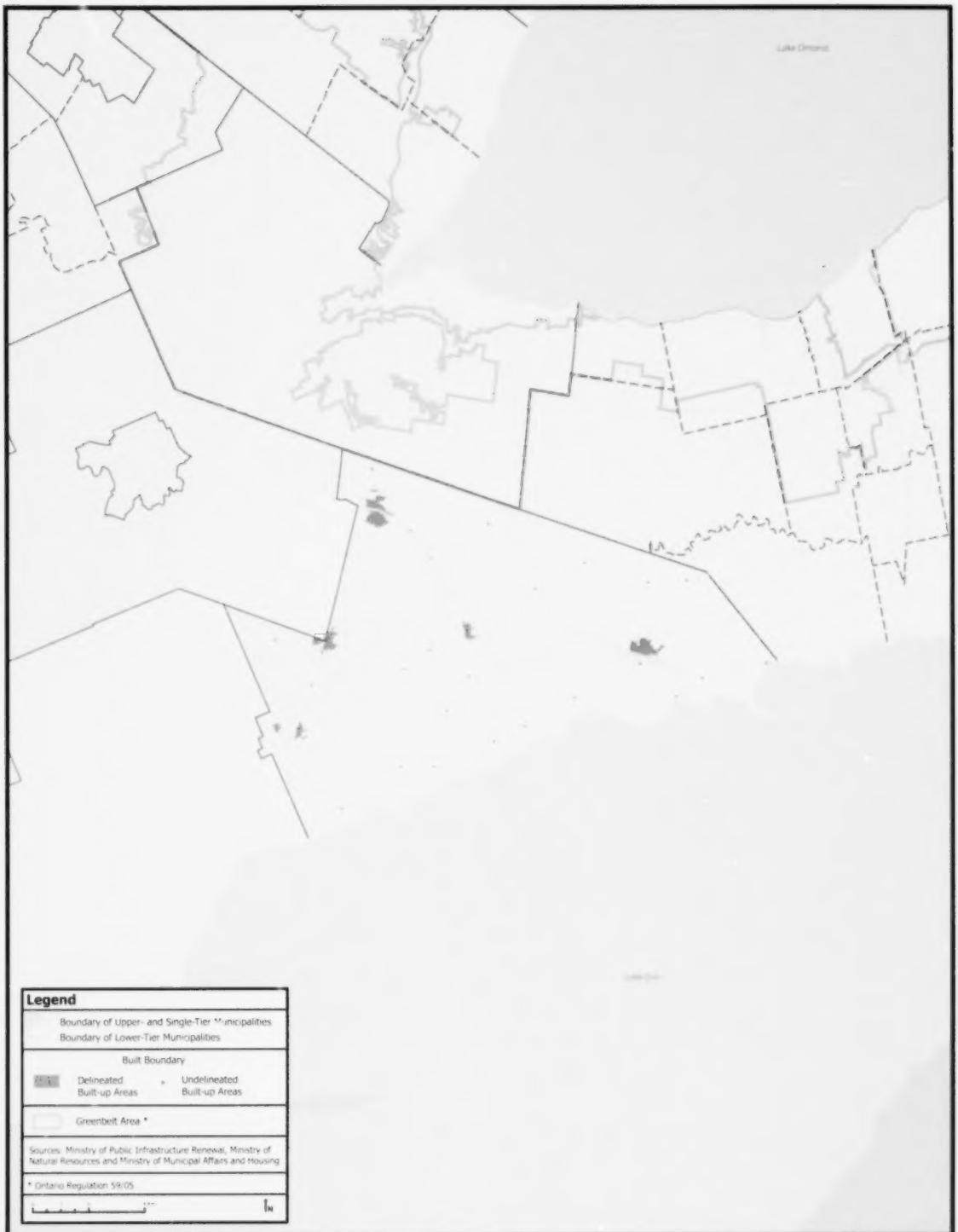
Lake Ontario
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05
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Built Boundary for the County of Haldimand

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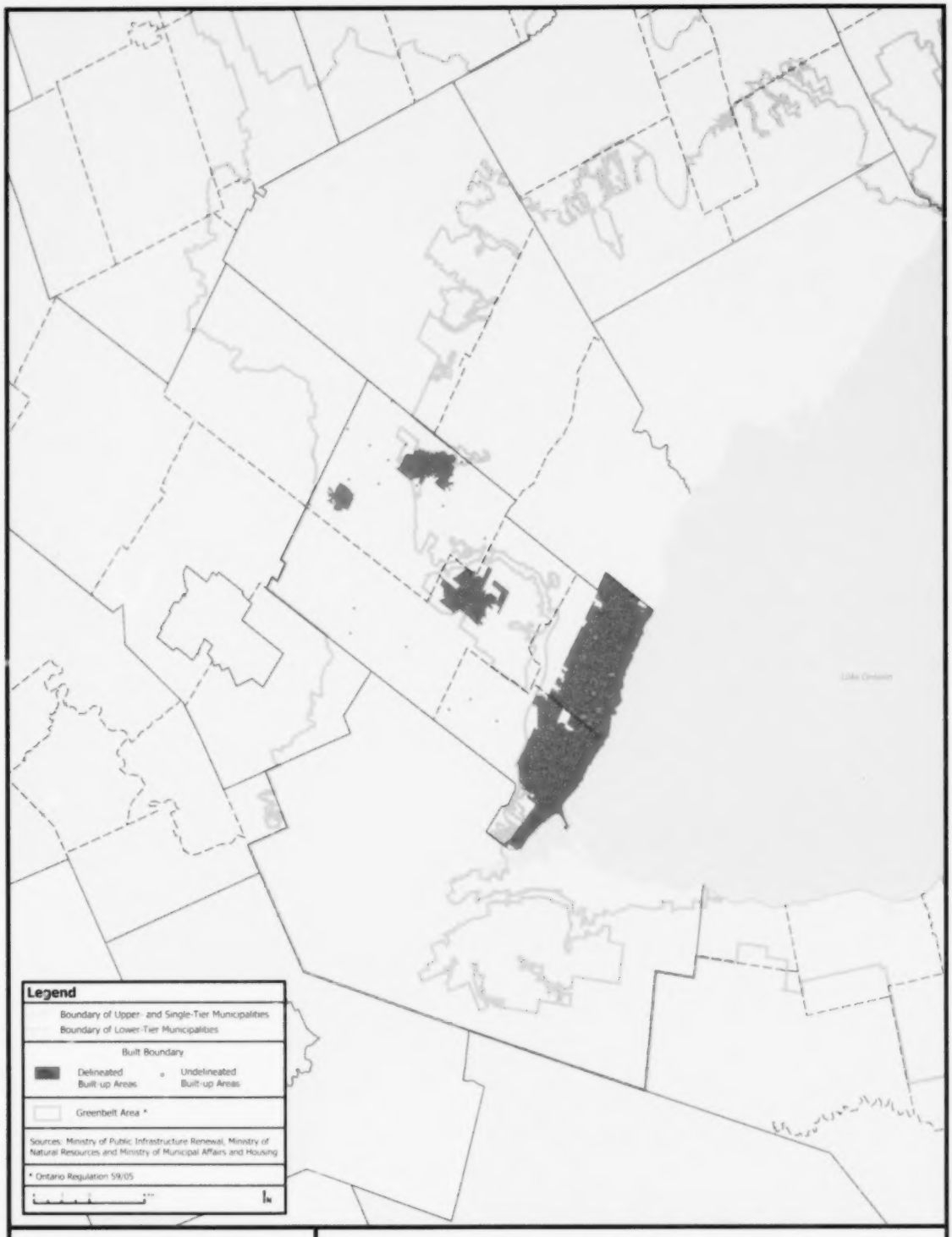
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
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Built Boundary for the Region of Halton

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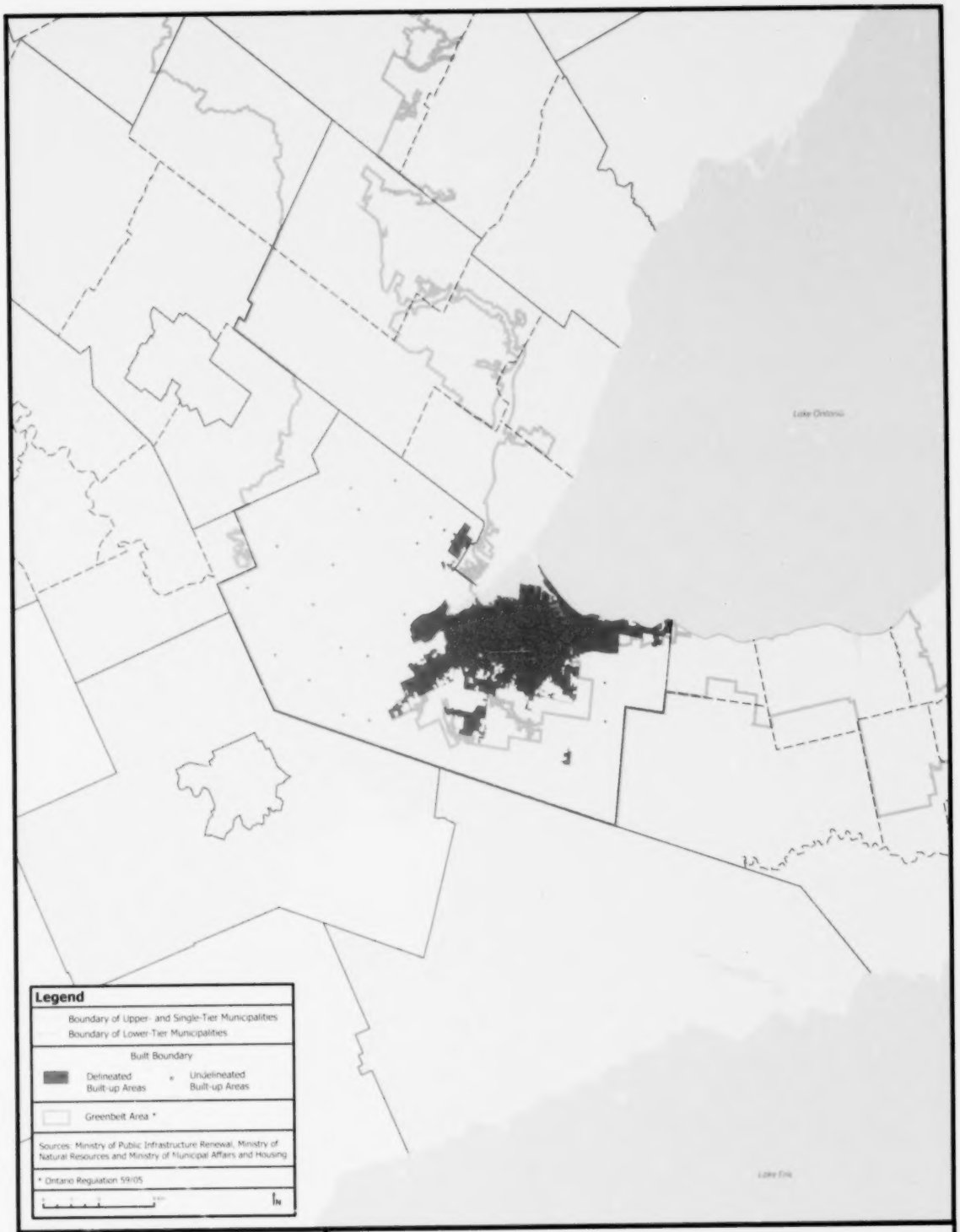
Lake Ontario
Lake Erie
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05
N

Built Boundary for the City of Hamilton

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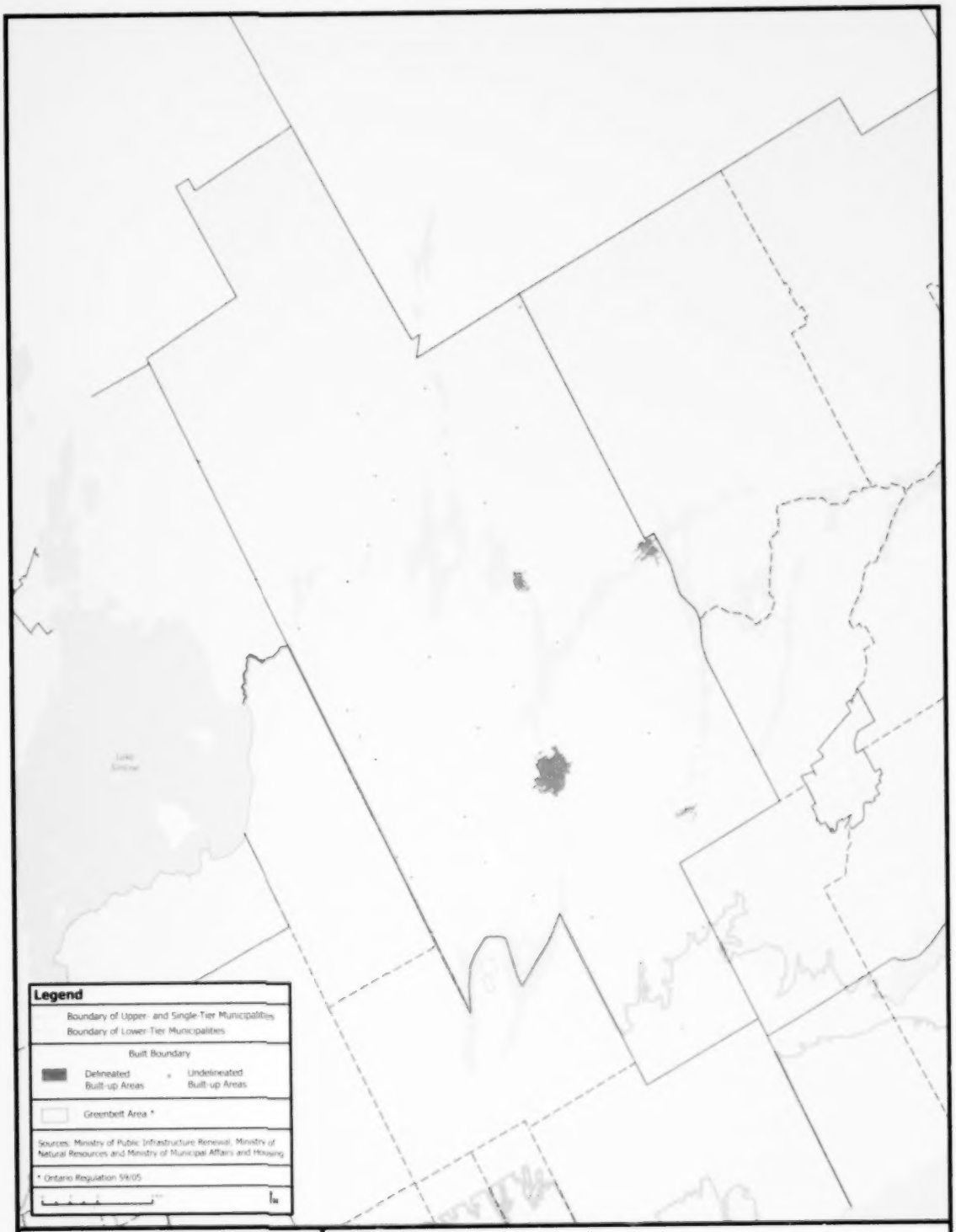
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Built Boundary
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Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

Built Boundary for the City of Kawartha Lakes

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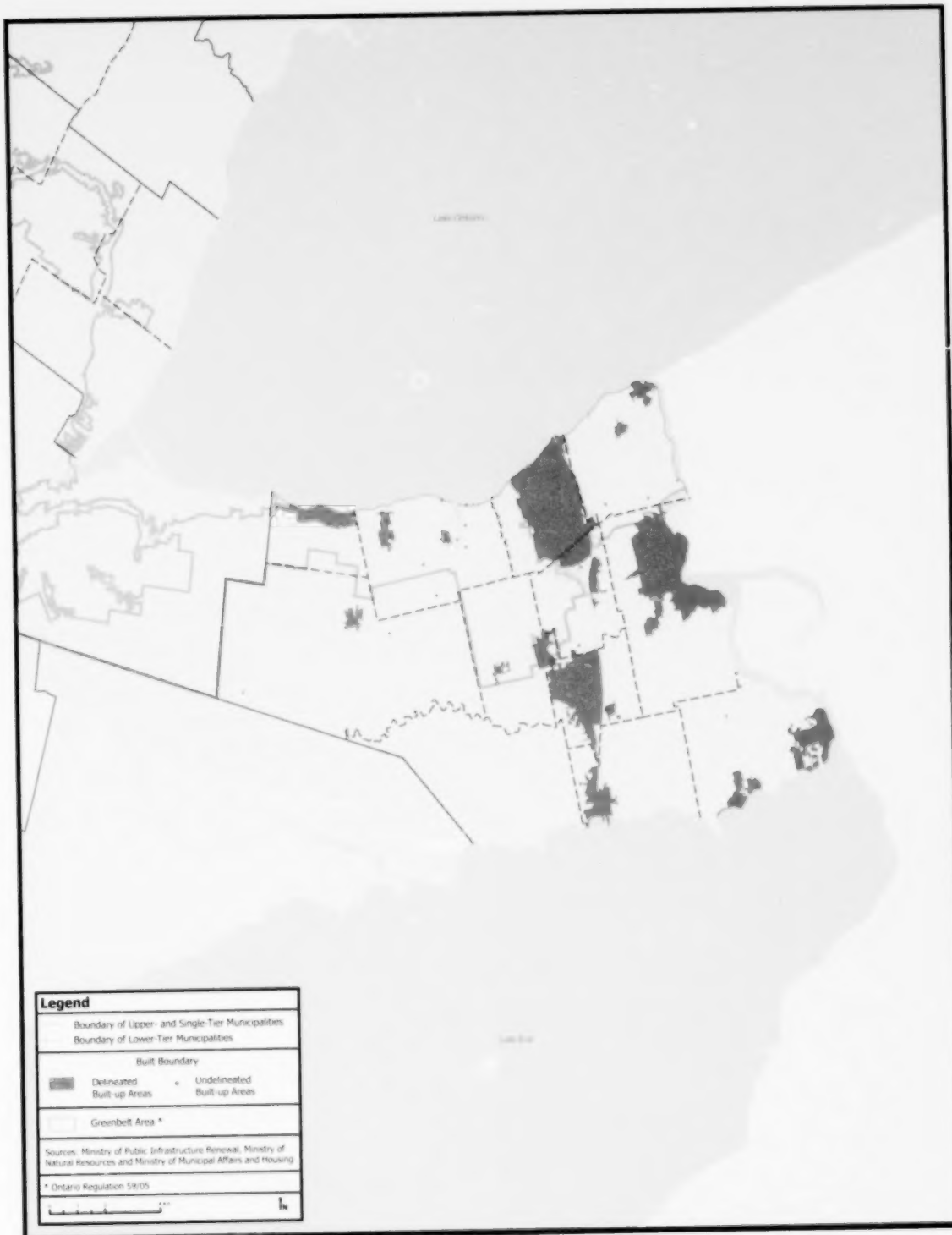
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Built Boundary
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Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

Built Boundary for the Region of Niagara

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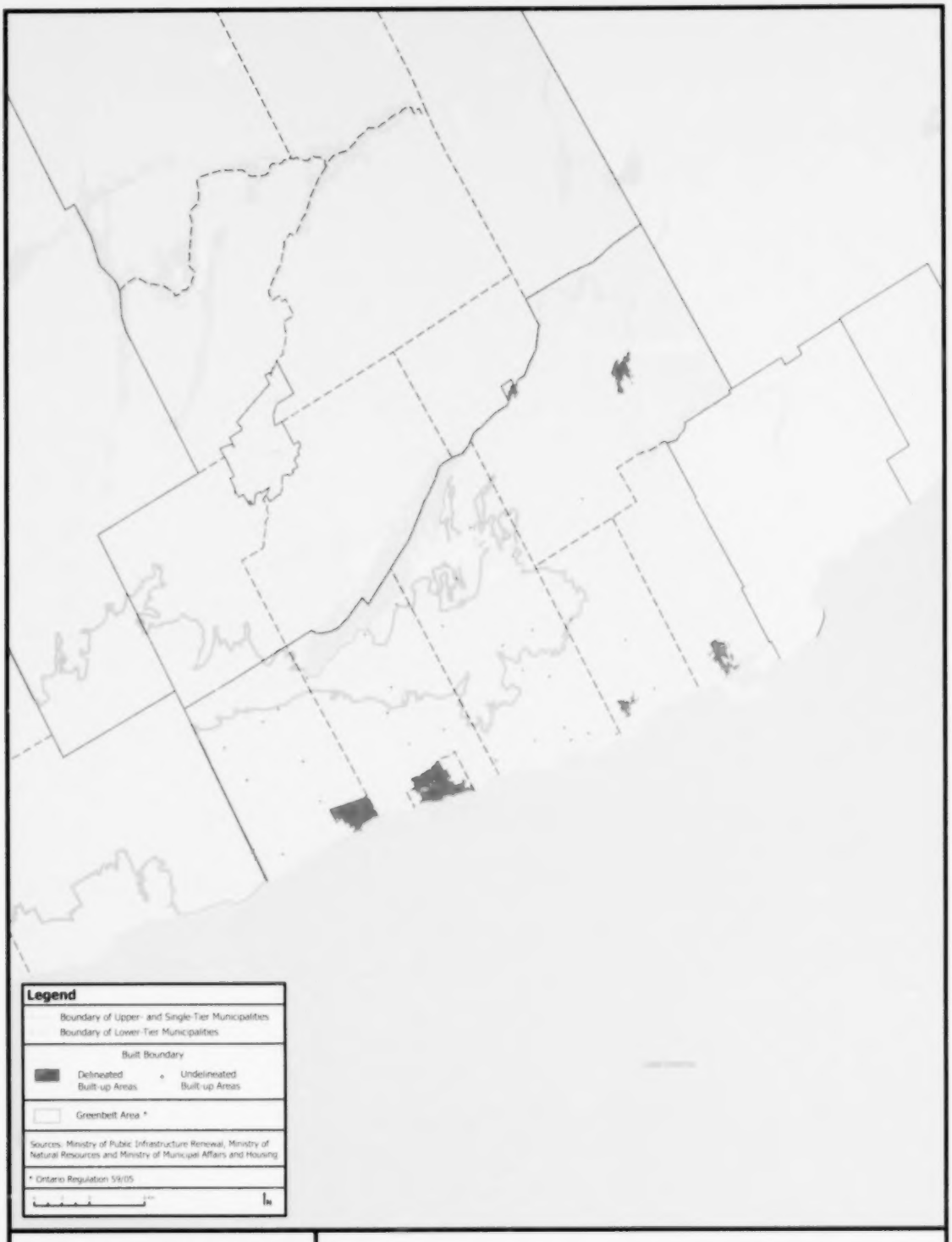
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Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
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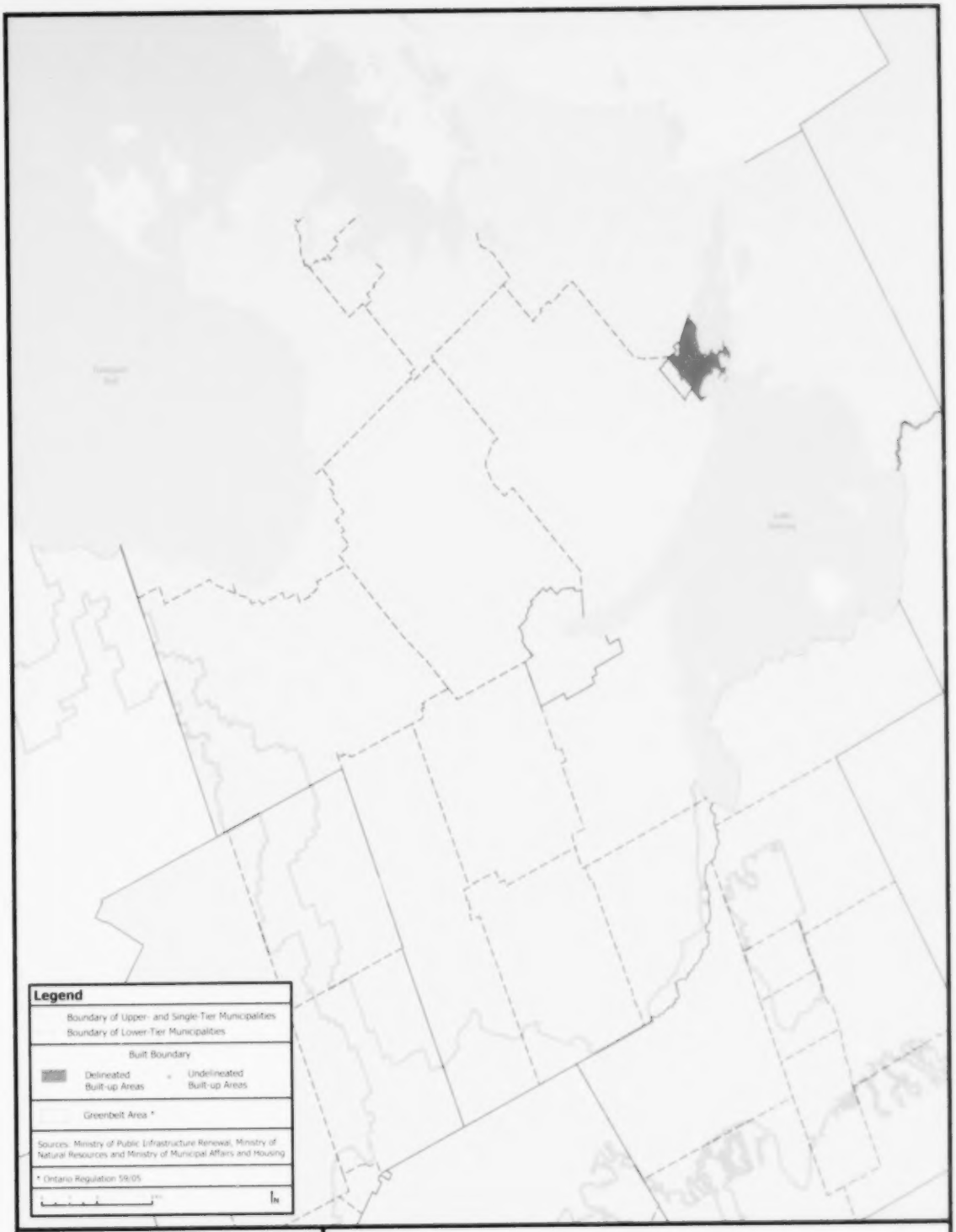
* Ontario Regulation 59/05

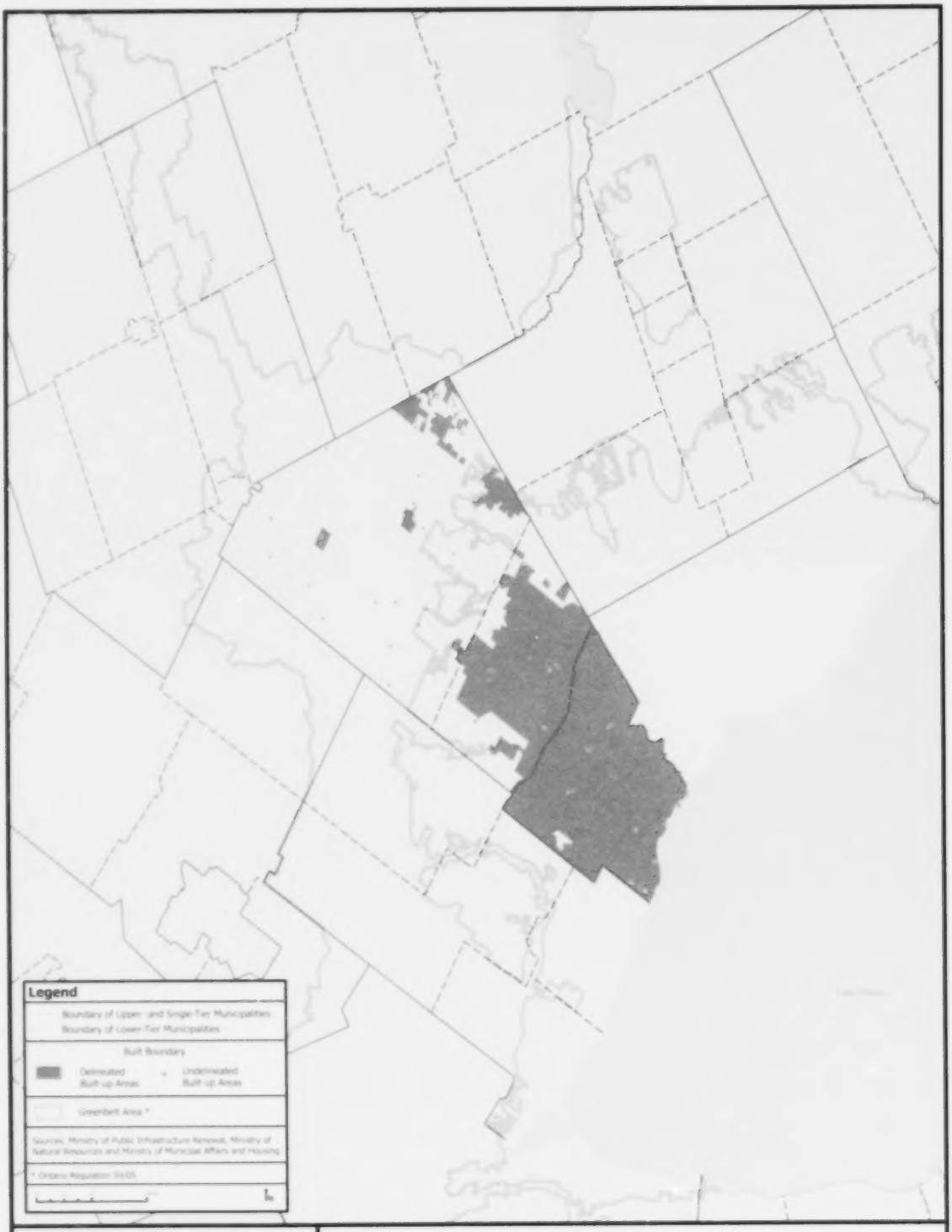
Built Boundary for the County of Northumberland

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05
N

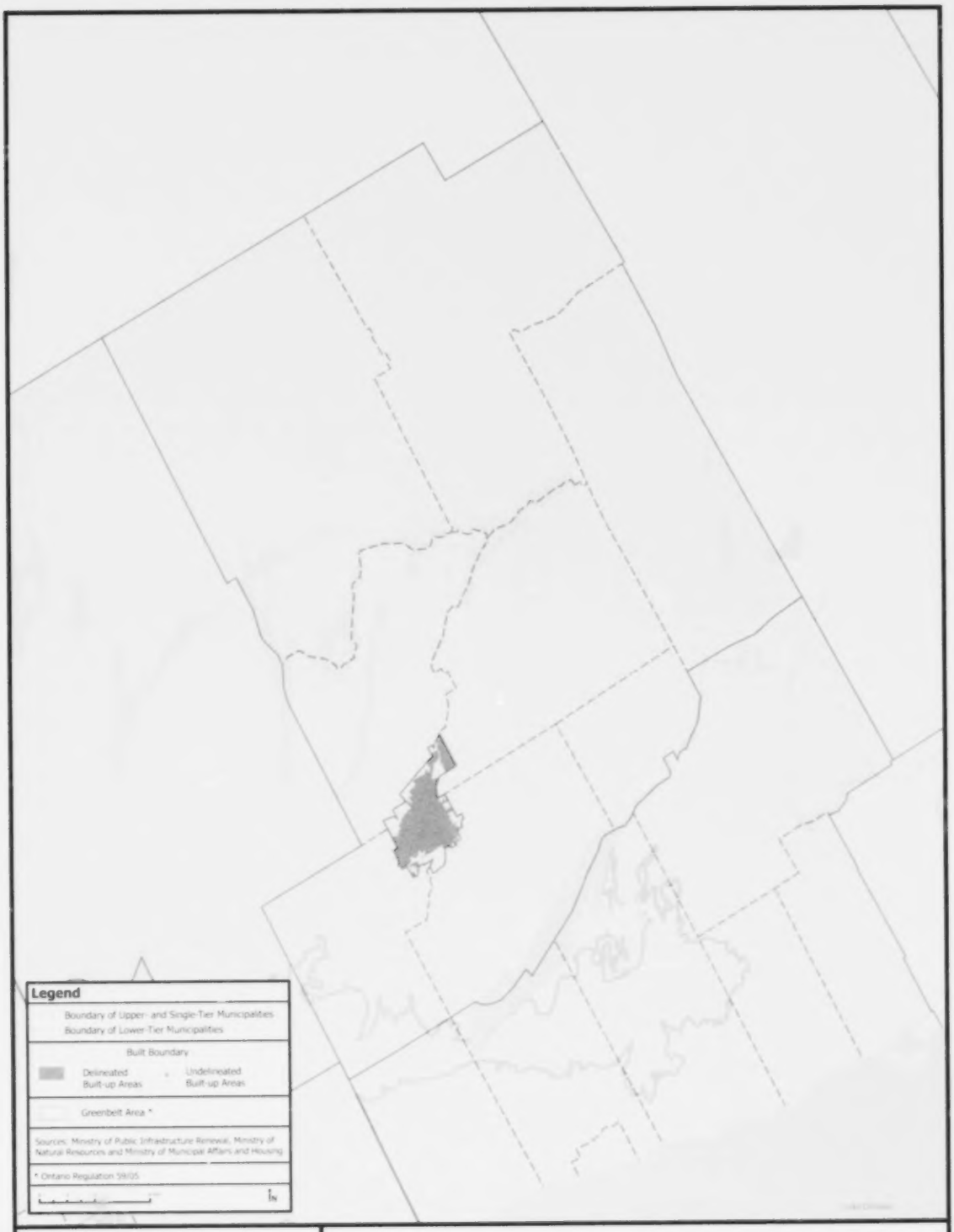
Built Boundary for the City of Orillia

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

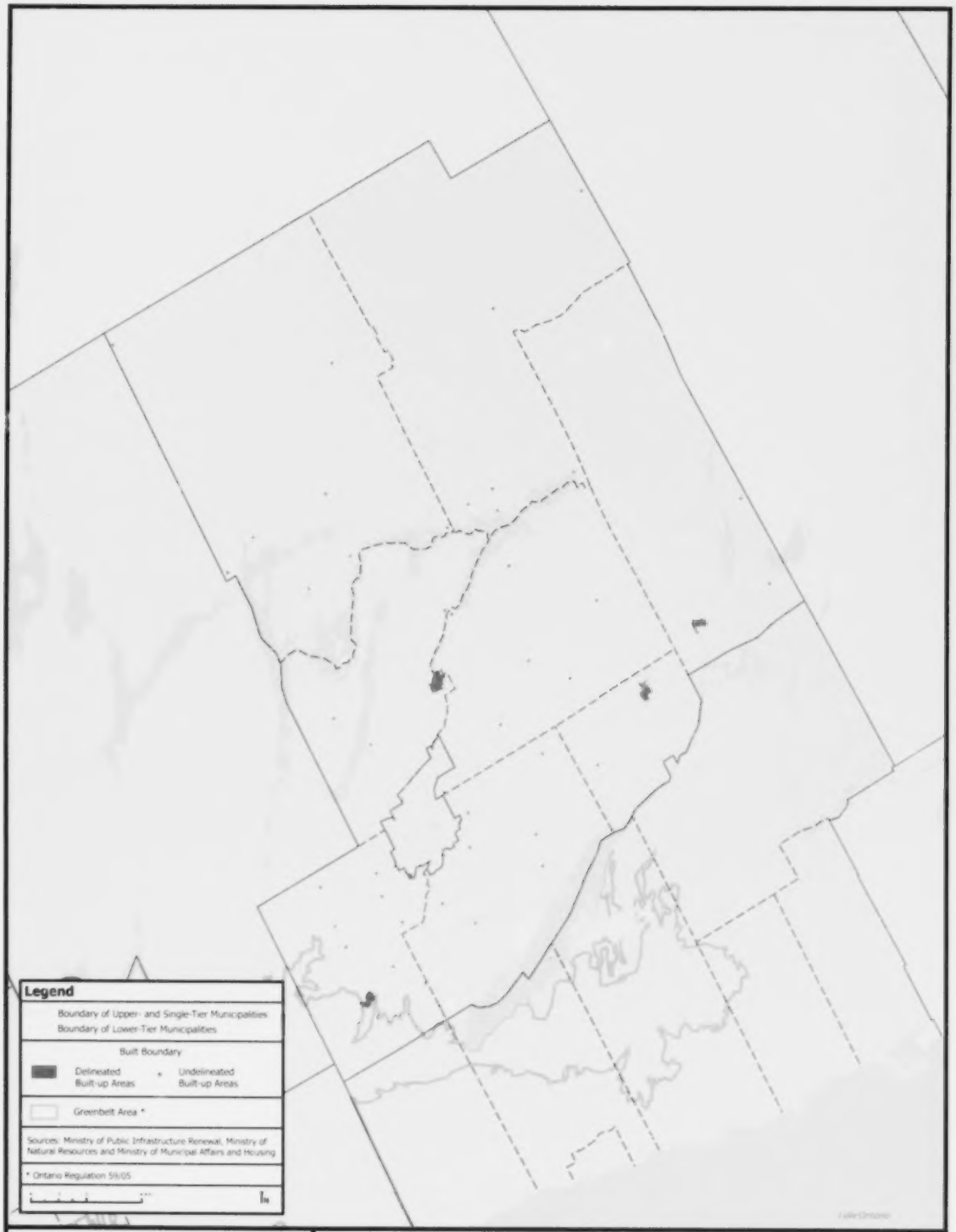
Built Boundary for the Region of Peel

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05
N

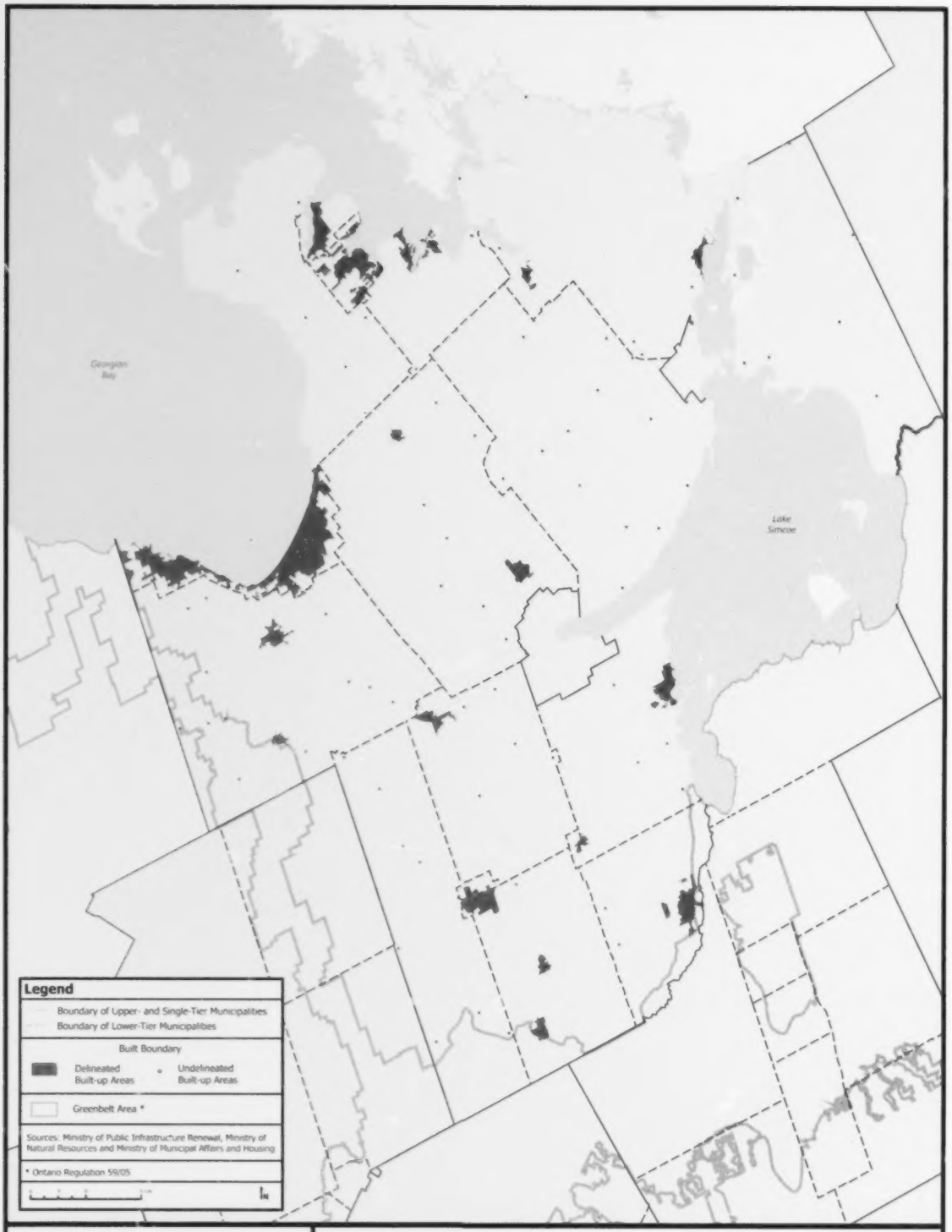
Built Boundary for the City of Peterborough

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

Built Boundary for the County of Peterborough

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Georgian Bay
Lake Simcoe
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

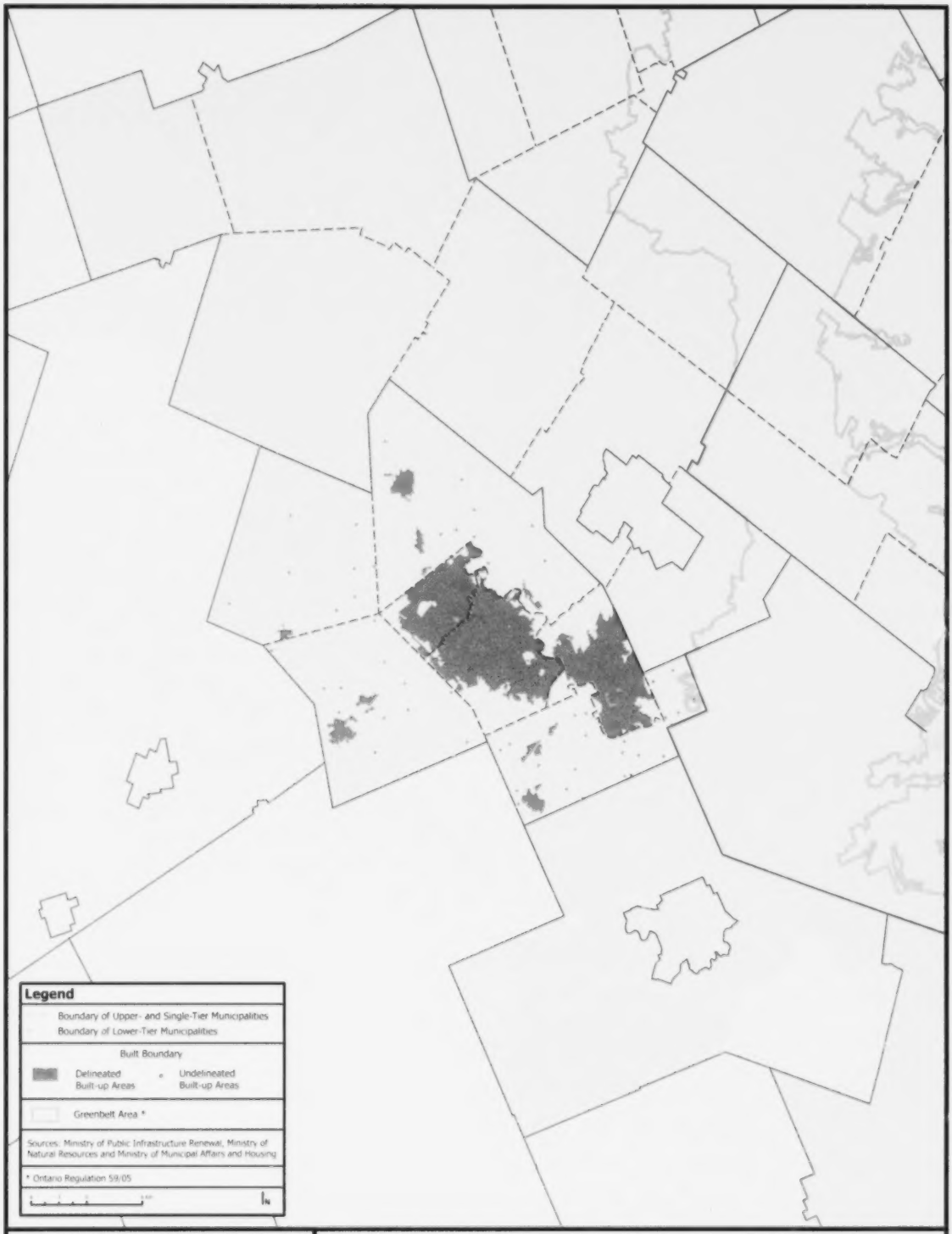
Built Boundary for the County of Simcoe

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.

Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

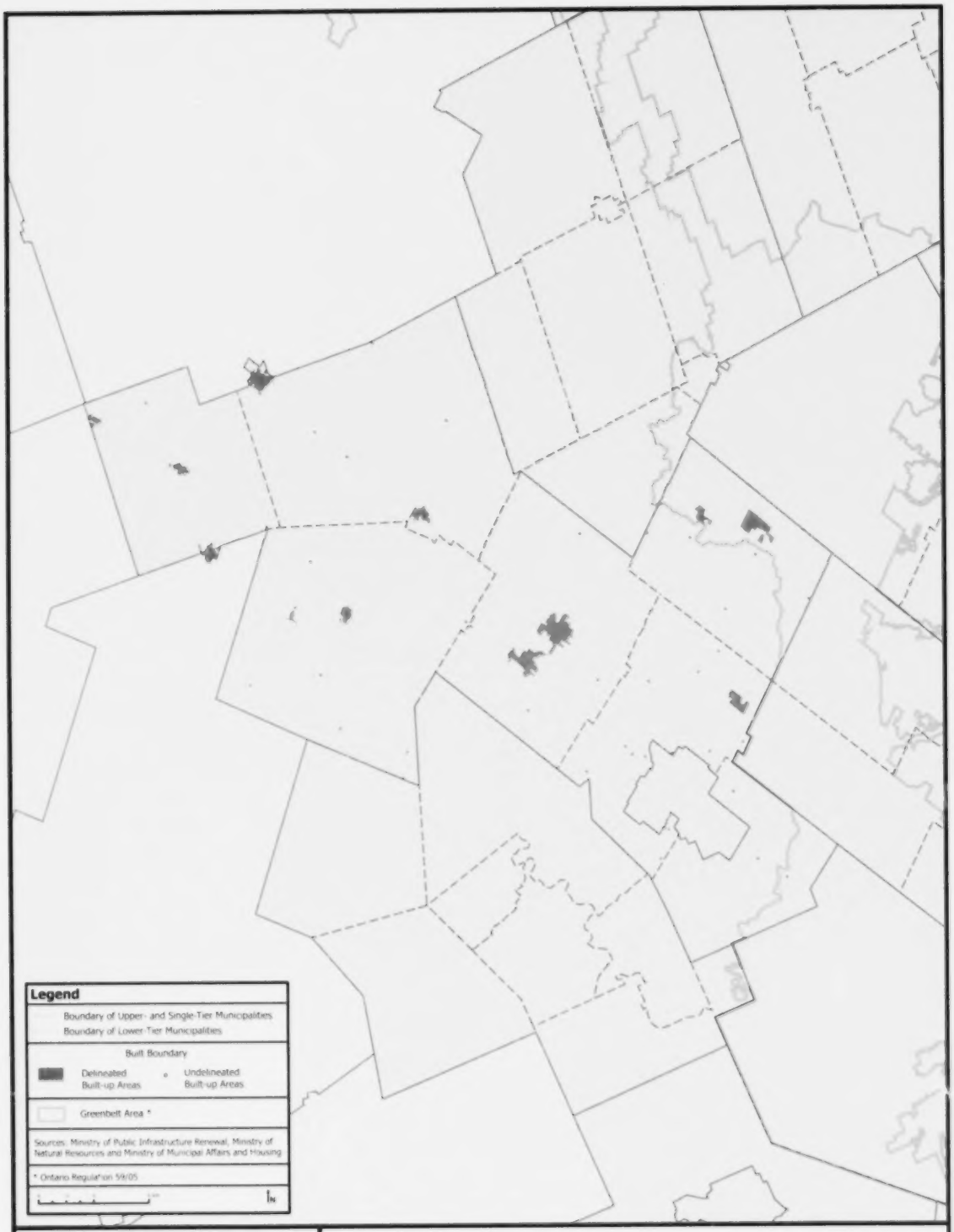
Built Boundary for the City of Toronto

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

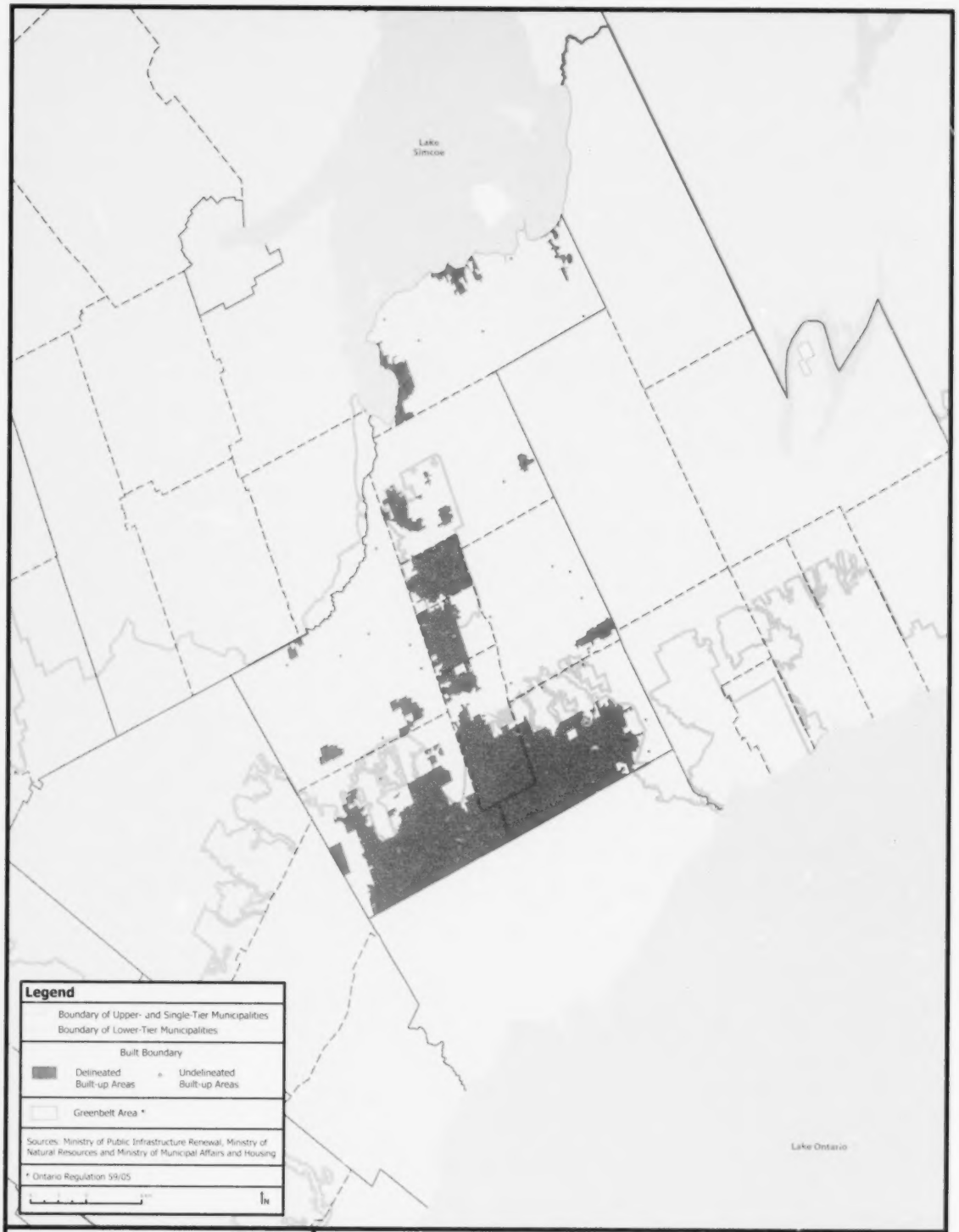
Built Boundary for the Region of Waterloo

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05
N

Built Boundary for the County of Wellington

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.


Lake Simcoe
Lake Ontario
Legend
Boundary of Upper- and Single-Tier Municipalities
Boundary of Lower-Tier Municipalities
Built Boundary
Delineated Built-up Areas
Undelineated Built-up Areas
Greenbelt Area *
Sources: Ministry of Public Infrastructure Renewal, Ministry of Natural Resources and Ministry of Municipal Affairs and Housing
* Ontario Regulation 59/05

Built Boundary for the Region of York

The information displayed on the base map has been compiled from various sources, may not accurately reflect approved land-use and planning boundaries, may not be to scale, and may be out of date. The Province of Ontario assumes no responsibility or liability for any consequences of any use made of this map.

SECTION 4.

Definitions

The definitions of the following words used in this document have the same meaning and definition as in the *Growth Plan for the Greater Golden Horseshoe, 2006*.

Brownfield Sites
Undeveloped or previously developed properties that may be contaminated. They are usually, but not exclusively, former industrial or commercial properties that may be underutilized, derelict or vacant.

Built-up Area[8]
All land within the built boundary.

Built Boundary[8]
The limits of the developed urban area as defined by the Minister of Public Infrastructure Renewal in accordance with Policy 2.2.3.5 [in the *Growth Plan for the Greater Golden Horseshoe, 2006*].

Density Target
The density target for urban growth centres is defined in Policies 2.2.4.5 and 2.2.4.6 [in the *Growth Plan for the Greater Golden Horseshoe, 2006*].

The density target for designated greenfield areas is defined in Policies 2.2.7.2, 2.2.7.3 and 2.2.7.5 [in the *Growth Plan for the Greater Golden Horseshoe, 2006*].

Designated Greenfield Area
The area within a settlement area that is not built-up area. Where a settlement area does not have a built boundary, the entire settlement area is considered designated greenfield area.

Geographic Information System (GIS)
A computer system designed to allow users to collect, manage and analyze large volumes of spatially referenced information and associated attribute data.

8 The built boundary consists of delineated and undelineated built-up areas.

Greater Golden Horseshoe
The geographic area designated as the Greater Golden Horseshoe growth plan area in Ontario Regulation 416/05.

Grid cell
The 250m X 250m square used to manage, group and aggregate land-use and parcel records for the purpose of analyzing and identifying built areas in the methodology outlined in this paper.

Greyfields
Previously developed properties that are not contaminated. They are usually, but not exclusively, former commercial properties that may be underutilized, derelict or vacant.

Intensification
The development of a property, site or area at a higher density than currently exists through:

a. redevelopment, including the reuse of brownfield sites;
b. the development of vacant and/or underutilized lots within previously developed areas;
c. infill development; or
d. the expansion or conversion of existing buildings.

Intensification Target
The intensification target is as established in Policies 2.2.3.1, 2.2.3.2, 2.2.3.3, and 2.2.3.4 [in the *Growth Plan for the Greater Golden Horseshoe, 2006*].

Parcel
The boundary polygon defining the extents of an individual property as identified and recorded by Teranet Inc. and obtained for this analysis through the Ontario Parcel Alliance.

Redevelopment
The creation of new units, uses or lots on previously developed land in existing communities, including brownfield sites.

Residential unit
A dwelling as identified by the Municipal Property Assessment Corporation for which assessment records are maintained.

Settlement Areas

Urban areas and rural settlement areas within municipalities (such as cities, towns, villages and hamlets) where:

a. development is concentrated and which have a mix of land uses; and
b. lands have been designated in an official plan for development over the long term planning horizon provided for in the *Provincial Policy Statement, 2005*. Where there are no lands that have been designated over the long-term, the settlement area may be no larger than the area where development is concentrated.

Urban Growth Centres

Locations set out in Schedule 4 [of the *Growth Plan for the Greater Golden Horseshoe, 2006*]. Urban Growth Centres will be delineated pursuant to Policies 2.2.4.2 and 2.2.4.3 [in the *Growth Plan for the Greater Golden Horseshoe, 2006*].

For specific policies, please refer to the *Growth Plan for the Greater Golden Horseshoe, 2006* which can be found at www.placestogrow.ca.

Appendices

Appendix 1: Bibliography

Listed below is a partial bibliography of published and unpublished work on defining built-up areas. The analyses and methods in the literature and case studies below apply to varying scales - some at the large scale of a country and others at the very local scale of zoning.

All weblinks cited below were confirmed as active on April 2, 2008.

Batty, Michael Yichun Xie & Zhanli Sun (1999); *The Dynamics of Urban Sprawl*; CASA Working Paper Number 15. Centre for Advanced Spatial Analysis (CASA), University College London.
http://www.casa.ucl.ac.uk/publications/workingPaperDetail.asp?ID=15

Batty, Michael, Elena Besussi, Nancy Chin (2003); *Traffic, Urban Growth and Suburban Sprawl*; CASA Working Paper Number 70. Centre for Advanced Spatial Analysis (CASA), University College London.
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Burchfield, Marcy, Henry G. Overman, Diego Puga, Matthew A. Turner (2003); *Causes of Sprawl: A Portrait from Space*; Working Paper, University of Toronto Department of Economics.

Federal Register (2002); *Urban Area Criteria for Census 2000*; Washington DC, Bureau of Census.

Chin, Nancy (2002); *Unearthing the Roots of Urban Sprawl: A Critical Analysis of Form, Function and Methodology*; CASA Working Paper Number 47. Centre for Advanced Spatial Analysis (CASA), University College London.
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Churchman, Arza (1999); *Disentangling the Concept of Destiny*; Journal of Planning Literature, Vol.13, No. 4, (May) pp.389-411

City of Toronto, (2000); *Clean, Green and Healthy: A Plan for an Environmentally Sustainable Toronto*; Final report of Environment Task Force.
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DRCOG/APA Planning Commissioners Workshop (2002); *Civitas*.

Australian Department of Primary Industries and Energy / Department of Human Services and Health, (1994); *Rural, Remote and Metropolitan Areas Classification 1991 Census Edition*; Australian Government Publishing Service, Canberra, Commonwealth of Australia.

United States Department of Agriculture Economic Research Service, (2003); *Measuring Rurality: New Definitions in 2003.*
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Ewing, R., Pendall, R., & Chen, D. (2002); *Measuring sprawl and its impact: the character & consequences of metropolitan expansion*; Washington DC: Smart Growth America.

Hess, George R. et.al. (2001); *Just What is Sprawl, Anyway?*; North Carolina State University, Raleigh, NC.

Miron, John R (2003); *Urban Sprawl in Canada and America: just how dissimilar?*; University of Toronto at Scarborough.
http://citieslab.utsc.utoronto.ca/Papers/UrbanSprawl.pdf

Mitchell, Bill (2002); Bibliography of Sources; taken from *Compact Cities and Urban Intensification: Desirable, Acceptable, Achievable?*

Moglen, G.E., S.A Gabriel and J.A. Faria (2003); *A Framework for Quantitative Smart Growth*; Land Development's Journal of the American Water Resources Association; Vol. 39 no. 4, pp.947-959.
http://www.eng.umd.edu/~sgabriel/Research/publications/JAWRA-SmartGrowth.pdf

Northwest Environment Watch (2004); *The Portland Exception. A Comparison of Sprawl, Smart Growth, and Rural Land Loss in 15 US Cities*; Northwest Environment Watch, Seattle, Washington.
http://www.sightline.org/

Oregon Health and Science University, (2004); Office of Rural Health; *Definitions of Rural & Assessing Healthcare Needs.*

Rural Doctors Workforce Agency, (2004); *Rural, Remote, Metropolitan Areas Classification.*

San Francisco League of Conservation Voters (2004); *Definitions & Calculations: This View of Density.*
http://www.sflcv.org/density/

Statistics Canada (2001); *Census Dictionary*- Geography Section.
www12.statcan.ca/english/census01/Products/Reference/dict/geotoc.htm

Torrens, Paul M. and Marina Alberti (2000); *Measuring Sprawl- CASA Working Paper Number 27*; Centre for Advanced Spatial Analysis (CASA), University College London.
http://www.casa.ucl.ac.uk/publications/workingPaperDetail.asp?ID=27

United States Census Bureau (2003); *Differences Between the 1990 Census and Census 2000 Urbanized Area Criteria.*

US Census Bureau, (2004); *Census 2000 Urban and Rural Classification.*

Waddell, Paul (2000); *Monitoring and Simulating Land Capacity at the Parcel Level, in Monitoring Land Supply with Geographic Information Systems: Theory, Practice and Parcel-Based Approaches*; Vernez-Moudon, A. and M. Hubner, eds., John Wiley & Sons, Inc.: New York., (pp. 201-214).

Wassmer, Robert W. (2000); *Urban Sprawl in a U.S. Metropolitan Area: Ways to Measure and a Comparison of the Sacramento Area to Similar Metropolitan Areas in California and the U.S.*; Social Science Research Network.

Zhang, Wanquing, Angella Bowman & Keith Mueller; *Rural / Urban Definitions: Alternatives and Numbers by State*; Nebraska Centre for Rural Health Research.

Appendix 2: Overview and Description of Municipal Property Assessment Corporation and Ontario Parcel Alliance Datasets

For the purposes of this paper, the two datasets which make up the parcel land-use database are referred to as the OPA dataset for the geographic location and outline of each parcel, and the MPAC dataset for the land use and residential unit count information within each parcel.

Included in these two information sources are geospatial locations, land-use designations and the number of residential units on the property. In theory, the location of every parcel is known, as are its land uses and the number of residential units. Shortcomings in data quality mean that not all these attributes are always known or accurate for all of the approximately 2.4 million parcels within the Greater Golden Horseshoe. The datasets do not include a parcel fabric for roads and water bodies.

The OPA and MPAC datasets obtained by the Ministry of Public Infrastructure Renewal contained only land use, unit count, and parcel number information. The datasets used to develop this methodology and those applied in this analysis did not contain any confidential, personal and financial information. For a full list of attributes contained in the MPAC dataset obtained by the Ministry of Public Infrastructure Renewal and used for this analysis, please refer to Appendix 3.

Brief overview of MPAC dataset

Every municipality in Ontario is a member of the Municipal Property Assessment Corporation (MPAC), a non-share capital, not-for-profit corporation whose main responsibility is to provide its customers – property owners, tenants, municipalities, government and business stakeholders – with property assessments. MPAC administers a uniform, province-wide property assessment system based on current value assessment in accordance with the provisions of the Assessment Act.

MPAC receives all the registered Land Transfer Tax Affidavits (LTTA) within the Province of Ontario. Upon receipt of this information, MPAC investigates and codes this information into its database.

MPAC data is classified into nine key property types:

- Commercial
- Industrial
- Residential
- Farm
- Multi-residential
- Managed Forest

- Pipeline
- Special and Exempt
- Vacant Land

Within each of these types, the following fields were used for compiling the database used to create the built boundary:

- Assessment Roll number
- Property code
- Property code description
- Location address including postal code
- Site Area
- Site Area Unit of measure (Acres or Square Feet)
- Realty Tax Class
- Realty Tax Qualifier
- Number of residential units for:
  - Muti-residential properties
  - Non-residential properties

Brief overview of OPA dataset

The Ontario Parcel Alliance (OPA) has been created jointly by Teranet Enterprises Inc., MPAC and the Ministry of Natural Resources.

The OPA data is a standardized, Ontario-wide, geospatial dataset of assessment, ownership and Crown parcels of land. The OPA database includes parcel boundaries, assessment roll numbers, and property identification numbers where applicable.

The OPA data consists of three parcel layers - assessment, ownership and Crown. Of these, the assessment and Crown layers were used in the creation of a built boundary.

Assessment parcels are areas defined by a boundary and an assessment roll number (ARN), for property assessment purposes as determined by MPAC. The assessment parcel is mapped for the entire province. Crown Land Parcels are those owned by the Crown, and are also mapped for the entire province, except in areas where more detailed sub-ownership mapping already exists.

Benefits and challenges in using MPAC and OPA data for determining a built boundary for the Greater Golden Horseshoe

While the MPAC and OPA datasets have been selected as the most appropriate and useful to identify a built boundary for the Greater Golden Horseshoe, the data is not without its challenges.

The key reasons why the MPAC and OPA data are most appropriate are:

- Data is available in a consistent format for the entire geography of the Greater Golden Horseshoe.
- Data is updated regularly and is available annually at a minimum.
- Greater Golden Horseshoe upper-, single- and lower-tier municipalities have full access to these datasets.
- Data tracks residential units each year, which allows for measurement of the Growth Plan intensification target.

Challenges in using this data have included:

- Currency of MPAC data can vary across the Greater Golden Horseshoe. Municipalities report that the data can be as many as two years out of date and that there are errors. The primary reason for this delay is that the reporting processes can take time since there is often a need for individual validation of records. These issues are addressed in Step 4 of the methodology.
- There are some challenges in simply building a combined dataset that has the land use, the number of residential units and the parcel boundaries on it. Part of this is the historical way the files have been built since many uses are made of the same property and thus multiple files have been developed. In addition, linking files between the two datasets can be challenging. These issues are addressed in Step 1 of the methodology.
- There is no parcel or land-use information for roads and highways.
- Land use data on the parcel records may not fully reflect the actual use of the land. There are also often multiple uses on single parcels and though MPAC records list primary and secondary uses, these may not reflect all the actual uses on the parcel. An example of this can be commercial and industrial land where some owners may own more land than they have yet to develop.

  The consultation and verification process and application of Step 4 is intended to identify and address such shortcomings in the datasets.

Implications with regard to sub-division developments

The use of parcel data according to their recorded land use by MPAC means that land that has been approved for development, such as registered sub-divisions, but is not yet built, will be considered unbuilt. Similar situations involve newly-built condominium structures. Parcels that are built-up prior to June 16, 2006, the effective date of the Growth Plan, that are not captured in the MPAC dataset and thus not included as part of this analysis, will be identified and accounted for in Step 4 of this methodology.

Appendix 3: Assignment of Summary Land-use Codes to Municipal Property Assessment Corporation Property Codes

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
000	10,778	U	Not matched - unknown
100	129,361	UB	Vacant residential land not on water
101	1,871	UB	Second tier vacant lot
102	1,998	GNA	Land of a Conservation Authority
103	3,892	GNA	Municipal park (excludes Provincial & Fed parks)
105	5,604	UB	Vacant commercial land
106	6,363	UB	Vacant industrial land
107	102	GNA	Provincial park
108	15	GNA	Federal park
109	180	UB	Recreational land not on water
110	4,907	UB	Vacant residential/recreational land on water
111	93	UB	Island under single ownership
112	717	UB	Multi-residential vacant land
113	35	UB	Condo development land res
114	4	UB	Condo development land non-res
115	37	B	Dev in progress existing structure
120	523	GNA	Water lot (entirely under water)
125	1,257	UB	Residential development land
127	330	B	Townhouse block freehold
130	2,415	B	Non-buildable land (walkways etc)
134	100	GNA	Land designated and zoned open space
140	29	GNA	Common land
169	173	UB	Vacant land condo res
200	19,644	UB	Farm property without any buildings (no structures may exist)
201	3,993	UB	Farm with residence (with or without secondary structures) but no farm buildings
210	4,093	UB	Farm without a residence but has outbuildings (farm and/or secondary structures)

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
211	27,977	UB	Farm with a residence (with or without secondary structures) and farm outbuildings.
220	214	UB	Farm without a residence but having a commercial/ industrial operation
221	1,413	UB	Farm with a residence and having a commercial/ industrial operation
222	103	UB	Farm with a winery
223	11	UB	Grain/feed seed operation
224	263	UB	Tobacco farm
225	1	UB	Ginseng farm
226	4	UB	Fxotic farms
228	48	UB	Farm with gravel pit
229	1	UB	Farm with campground etc
230	158	UB	Intensive farm operation without a residence
231	587	UB	Intensive farm operation with a residence
232	136	UB	Large scale greenhouse op
233	25	UB	Large scale swine op
234	345	UB	Large scale poultry op
235	33	UB	Government Agriculture research
240	1,171	UB	Managed forest property vacant not on water
241	49	UB	Managed forest property vacant on water
242	176	UB	Managed forest property seasonal res not on water
243	42	UB	Managed forest property seasonal res on water
244	1,305	UB	Managed forest property residence not on water
245	30	UB	Managed forest property residence on water
260	2,578	UB	Vacant residential/commercial/industrial owned by a non-farmer with a portion being farmed.
261	16,365	UB	Land owned by a non-farmer improved with a non-farm residence with a portion being farmed.
262	249	UB	Land owned by a farmer improved with a non-farm residence with a portion being farmed.
301	1,589,271	B	Single family detached (not on water)

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
302	2,343	B	More than one structure used for residential purposes with at least one of the structures occupied permanently
303	4,031	B	Residence with a commercial unit
304	1,665	B	Residence with a commercial/industrial use building
305	46,906	B	Link home
306	5	B	Boathouse with a residence above
307	4	B	Community lifestyle
309	81,745	B	Freehold townhouse/row house
311	206,851	B	Semi-detached residential use (includes true semi and single semi links)
313	13,380	B	Single family detached on lake or river
314	184	B	Clergy residence
322	3,311	B	Semi-detached with both units under one ownership
332	35,261	B	Residential property with 2 self-contained units (typically a duplex) (1)
333	11,129	B	Residential property with 3 self-contained units (1)
334	4,272	B	Residential property with 4 self-contained units (1)
335	1,357	B	Residential property with 5 self-contained units (1)
336	2,139	B	Residential property with 6 self-contained units (1)
340	7,972	B	Multi-residence with 7+ ex row
341	670	B	Multi-residence with 7+ with some commercial
350	358	B	Row Housing with 3-6 units under same owner
352	892	B	Row Housing with 7+ units under same owner
360	1,406	B	Rooming or boarding house
361	129	B	Bachelorette 7+
363	228	B	Housekeeping Cottages no American plan
364	2	B	Housekeeping Cottages <50% American plan
365	499	B	Group Home as defined in the Municipal Act
366	790	B	Student housing off-campus
369	49	UB	Vacant land condo res improved
370	5,103	B	Residential Condominium
371	1	B	Life Lease - No Redemption (no or limited redemption amounts)

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
372	61	B	Life Lease - Return on Invest (guaranteed return or market value based return on investment)
373	104	B	Cooperative Housing - Equity
374	643	B	Cooperative Housing - Non-equity
375	27	B	Co-ownership
378	1	B	Res leasehold condo corp
380	115	B	Res phased condo corp
381	170	B	Mobile Home - one or more homes on a parcel of land which is not a mobile home park operation.
382	100	B	Mobile Home Park - more than one mobile home on a parcel of land which is a mobile home operation.
383	748	B	Bed and Breakfast establishment (predominant use)
385	7	B	Time-share fee simple
391	19,345	B	Seasonal/Recreational Dwelling(s) - first tier on a lake or river
392	4,202	B	Seasonal/Recreational Dwelling(s) - second tier to water
395	7,971	B	Seasonal/Recreational Dwelling(s) - not associated with a lake or a river
400	1,656	B	Small Office Building
401	393	B	Small Medical/Dental Building single tenant
402	2,822	B	Large Office Building
403	377	B	Large Medical/Dental Building
405	2,643	B	Office Use Converted from House
406	853	B	Retail Use Converted from House
407	43	B	Lumber yard
408	199	B	Beer/LCBO
409	723	B	Retail one story >10k sf
410	7,771	B	Retail one story < 10k sf
411	968	B	Restaurant - Conventional
412	356	B	Restaurant - Fast Food
413	78	B	Restaurant - Conventional Nat Chain
414	668	B	Restaurant - Fast Food nat Chain

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
415	137	B	Cinema/Movie House/Drive-in Theatre
416	9	B	Concert Hall/Live Theatre
417	25	B	Entertainment complex with cinema
419	3	B	Auto service 400 series highways
420	1,971	B	Automotive Fuel Station with or without service facilities
421	3,113	B	Speciality Automotive Shop/Auto Repair/Collision Service/Car or Truck Wash
422	791	B	Auto Dealership
423	237	B	Auto Dealership indep dealer or used vehicles
425	370	B	Neighbourhood shopping centre with anchor
426	26	B	Small box shopping centre
427	89	B	Big box shopping centre
428	83	B	Regional Shopping Centre
429	139	B	Community Shopping Centre
430	2,981	B	Neighbourhood Shopping Centre no anchor
431	16	B	Department/Discount Store
432	639	B	Banks and similar financial institutions < 7,500 sf
433	58	B	Banks and similar financial institutions > 7,500 sf
434	234	B	Freestanding supermarket
435	78	B	Large retail building centre
436	184	B	Freestanding large retail >30,000 sf
438	156	B	Neighbourhood shopping centre with offices
441	344	B	Tavern small hotel
444	167	B	Full service hotel
445	141	B	Limited service hotel
447	2	B	Condo hotel unit
450	471	B	Motel (other than seasonal)
451	14	B	Seasonal Motel
460	20	B	Resort Hotel
461	1	B	Resort Lodge
462	45	B	Country inns and small inns
465	18	V	Child/Community camp/resort

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
470	120	B	Multi-type complex - defined as a large modern complex having multi-residential (seven units or more) and/or condominium together with co
471	19,615	B	Retail with residential unit(s) (above or behind)
472	623	B	Retail with office(s)
473	582	B	Retail with more than one non-retail use
475	195	B	Commercial condominium
476	6	B	Commercial condominium live/work
477	1,110	B	Retail with office <10,000
478	209	B	Retail with office >10,000
480	1,116	B	Surface parking lot ex fac
481	51	B	Parking garage - not associated.
482	95	B	Surface parking lot in conj
483	1	B	Parking garage - in conj
486	236	V	Campground
487	20	UB	Billboard
489	27	V	Driving range - not part of course
490	573	V	Golf course
491	32	V	Ski resort
492	111	B	Marina - on waterfront defined as a commercial facility for the maintenance
493	10	B	Marina - not on waterfront defined as a commercial facility for the maintenance
495	102	B	Communication tower
496	511	B	Communication buildings or communication structures
500	8	UB	Mine active
501	2	UB	Mine inactive
505	1	B	Saw/lumber mill
510	217	B	Heavy manufacturing ex auto
511	8	B	Pulp and Paper mill
512	61	B	Cement/asphalt manufacturing plant
513	116	B	Steel Mill

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
514	35	B	Automotive assembly/automotive parts manufacturing plant
515	4	B	Shipyard/drydock
516	7	B	Auto parts
517	17	B	Speciality steel
518	3	B	Smelter ore processing
520	14,386	B	Standard industrial properties not specifically identified by other Industrial
521	14	B	Distillery/brewery
522	45	B	Grain handling (including transfer elevators
523	33	B	Grain handling primary elevators
525	1	B	Process elevator
527	11	B	Abattoir/slaughter/rendering
528	5	B	Food processing
529	7	B	Freezer plant/cold storage
530	2,877	B	Warehousing
531	255	B	Mini-warehousing
532	1	B	Dry cleaning plant
535	1	B	Research and development facilities
540	4,055	B	Other industrial (all other types not specifically defined)
544	4	B	Truck terminal
545	16	B	Major distribution centre
550	2	B	Petro-chemical plant
551	4	B	Oil refinery
553	1	B	Bulk Oil/fuel distr
555	9	B	OPG hydraulic generating station
556	4	B	OPG nuclear generating station
558	395	B	Hydro One transformer station
560	678	B	MEU transformer station
561	2,250	B	Hydro One right-of-way
562	8	B	Private hydro right-of-way
563	16	B	Private hydraulic generating station

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
565	1	B	Private generating station (fossil fuel and Cogen)
566	20	B	Private transformer station
575	644	B	Industrial condominium
580	2,960	B	Industrial mall
588	83	B	Pipelines transmission
589	194	B	Compressor station distr gas
590	1,211	B	Water treatment pumping
591	1	B	Sewage/waste disposal (treatment)
592	9	B	Dump/transfer/incineration/land fill
593	782	B	Gravel pit
594	5	UB	Peat moss op
595	4	B	Heat or steam plant
596	6	B	Recycling facility
597	2,365	B	Railway right of way
598	253	B	Railway buildings
599	115	B	GO transit station/yard
601	214	B	Post secondary education - university
602	78	B	Multiple occupancy education institutional residence located on or off campus (e.g. Dormitories) Apartments or fraternity/sorority houses
605	3,474	B	School (elementary or secondary
608	153	B	Day care/nursery
610	144	B	Other educational institutions (e.g. schools for blind
611	259	B	Other institutional residences
621	157	B	Hospitals
623	10	B	Continuum of care seniors
624	24	B	Retirement/nursing homes
625	307	B	Nursing homes
626	344	B	Old age/retirement home
627	7	B	Other health care facility (e.g. Clarke Institute)
630	3	B	Federal Penal institution
631	23	B	Provincial Penal institution
632	7	B	Other Penal institution

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
700	649	B	Place of worship - with clergy res
701	4,002	B	Place of worship - without clergy res
702	1,016	B	Cemetery
703	2	B	Cemetery with non-internment
705	271	B	Funeral home
710	433	B	Recreational non-commercial sport club (ex golf and ski)
711	48	B	Bowling alley
713	3	B	Casino
715	14	B	Race track - auto
716	9	B	Race track horse with slots
718	75	B	Exhibition grounds/fair grounds
720	368	B	Commercial Sport complexes/pools/arenas/stadiums
721	68	B	Non-Commercial Sport complexes/pools/arenas/ stadiums
722	1	B	Professional sports complexes
725	20	B	Amusement park
726	14	B	Amusement park large regional
730	131	B	Museum and art gallery (non-profit)
731	235	B	Library and literary institutions
733	9	B	Convention conference centre
734	38	B	Banquet hall
735	716	B	Assembly hall
736	874	B	Clubs private
739	18	B	Local gov't airport
740	9	B	Airport leasehold
741	4	B	Airport Authority
742	152	B	Public transportation facility
743	4	B	International bridge/tunnel
744	15	B	Private airport hangar
745	4	B	Recreational airport
746	49	B	Subway station
748	9	B	Transit garage

Property Code	Number of Parcels	B-Built UB-Unbuilt GNA-Greenspace Not Available V-Variable	Description
749	14	B	Public Transport - other
750	7	B	Scientific/pharmaceutical/medical research facility
755	1	B	Lighthouses
760	20	B	Military base or camp
761	20	B	Armoury
762	1	B	Military education facility
805	154	B	Post Office
806	5	B	Postal; mechanical sorting facility
810	459	B	Fire Hall
812	42	B	Ambulance Base
815	93	B	Police Station
828	12	B	Gov't research pred offices
832	1	B	Gov't canals & locks
840	12	B	Port authority - port activities
842	12	B	Port authority - other activities
	2,414,229		

Source: MPAC, May 2006

Appendix 4: Other Data Sources Evaluated for the Built Boundary Methodology

Various sources were examined for comprehensiveness, applicability to the policy application of a built boundary for the purposes of the Growth Plan, level of geographic detail, currency of the data, accuracy of the data, availability of the data and its expected availability over time.

Statistics Canada's quinquennial census data

This is the most exhaustive source of demographic information available for very local areas of geography. Statistics Canada does define the 'urban area' for every urbanized place in Canada. The geographic specificity of the data as stored and as published is too broad in areas that are on the fringe of the urban area. Fringe area boundaries encompass extensive areas of undeveloped land and thus this data is inappropriate for the level of detail required to measure the objectives of the Growth Plan.

Private sector annual updates of the census data

A number of companies in Canada prepare annual 'updates' of the Census on the same geographic basis as the Census is published. These data are not based on actual fieldwork but are based on models developed using data trends at larger levels of geography and thus do not necessarily reflect actual changes on the ground. They also have the same geographic challenges as Statistics Canada data.

Canada Post

Canada Post maintains a count of residential and business delivery points for every postal code in Canada and updates these counts on a monthly basis. A residential delivery point is very similar to the household concept used by the Census and is also very similar to a residential unit as used to measure intensification in the Growth Plan. However, the geography of postal codes on the fringes of urban areas and in rural areas is inexact and very large and thus cannot be used for defining a built boundary.

Utilities

Electric, gas and telephone utilities keep track of where their customers are located. Theoretically, this information could be assembled into a database that would permit an address-based dataset to be compiled that could be used to define built-up areas. Unfortunately, there is no such compilation and the prospects of being able to work

with all the organizations involved to derive such a composite database, even within one utility sector, are unlikely. There would also be no guarantee that the information would be available annually. Geographic boundaries may also vary from utility to utility.

Aerial and satellite imagery

The automated and/or manual analysis of aerial and satellite imagery for defining urban areas has become a well-recognized and commonly accepted method for defining the urbanized extent of a city or a large region. The methods and data sources involved are complex. They are publicly available but are rarely undertaken over large areas. There are also some accuracy issues and a significant amount of ground validation is needed. The key shortcoming is that this approach has no direct ability to count one of the Growth Plan's key measures, that of residential units (since under any one rooftop visible on aerial photos could be very few or very many residential units). Also, while the approaches can differentiate between urban and non-urban uses, they have difficulty in differentiating different types of unbuilt land within existing urban uses (conservation areas from golf courses from parks, etc.) Such differentiation is important in setting where boundaries should actually be drawn.

Importantly, these images are the best indication of what is actually happening on the ground since they represent a real-life 'picture' at a point in time. They can also be repeated at regular intervals and can be expected to be available for the life of the Growth Plan. They will always be useful sources of information for refining a built boundary, but would not be used as the primary source for defining it.

Planning designations and related records

Most planning departments keep track of the use of land within their jurisdiction. They use a variety of data sources and organize and display the information according to their own particular needs. Land-use classifications can vary as can the determination of what the land is currently being used for as compared to what the land is zoned for. In many cases, actual geographic limits of a use are not pinpointed – only an approximation of the location and size. The currency and update schedules for these maps and data can vary. Also, these efforts focus on land and usually do not include a count of the number of residential units involved.

Some attempts have been made to assemble a composite picture of land-use planning designations across all the jurisdictions in the Greater Golden Horseshoe but none has yet been assembled that covers all municipalities in the Greater Golden Horseshoe. The Ministry of Municipal Affairs and Housing has a process in place to assemble a composite map that shows where urban land use is permitted according to official plans. However, this project does not identify where development currently exists.

Building permits and housing starts and completions

Since new residential units and most sizeable conversions require building permits, a system that tracks where these permits are located and then monitors them through to completion (starts and completions) could be used to identify built-up areas. Following building permits through to construction is important since it should be noted that many permits are issued that are subsequently not used to build or to convert a residential unit. At this time, no such consistent, composite monitoring is done across the entire Greater Golden Horseshoe. Very few municipalities geocode their building permits – i.e. assign a latitude and longitude position for each permit. It also appears that even fewer municipalities then track by location the start and completion of the new building and/or conversion. No provincial or federal organization does this. The Canada Housing and Mortgage Corportaion and Statistics Canada collect summary statistical information from local authorities but it is at the scale of each municipality. Thus this approach cannot be used.

Appendix 5: Sources and Currency Dates of Data

Attribute used/ Data	Source	Date
Primary Datasets		
Land uses and residential unit counts	Municipal Property Assessment Corporation	Current to end of 2005 (Tax Roll 2006 file)
Parcel geography	Ontario Parcel Alliance (Land Information Ontario)	May 2006
Settlement Areas	Ministry of Municipal Affairs and Housing	Revised to reflect most current extents in consultation with municipalities in Winter 2008.
Secondary Datasets		
Upper-, Lower- and Single-Tier boundaries	Ministry of Municipal Affairs and Housing	January 2006
Ontario Indian Reserves 2006 Update	Land Information Ontario, Ministry of Natural Resources	March 2006
Datasets used to aid refinement in Step 4		
Ontario Road Network	Land Information Ontario, Ministry of Natural Resources	June 2006
Statistics Canada Hydrological Layer	Statistics Canada	2006
Othophotos (MrSid format)	Ministry of Natural Resources	2002 for entire Greater Golden Horseshoe 2005 for the Greater Toronto Area and Hamilton 2006 for the Grand River area

Please note that the refinement methodology described in Step 4 allows corrections for errors, omissions, and out-of-date elements in these datasets.

Get Involved

For more information on the built boundary or the Growth Plan for the Greater Golden Horseshoe, please visit the Places to Grow website at www.placestogrow.ca or call our toll-free line at 1-866-479-9781. You can also write to us at:

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